

AN EPIDEMIOLOGICAL STUDY OF BURN DEATHS IN EASTERN INDIA: AN AUTOPSY BASED STUDY

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Abstract

Background: A large number of deaths occur in India every year due to burn injuries. In our country Burn deaths are a major public health problem. Aim of this study is to find out the epidemiology of death and macroscopic appearance of kidneys due to burn injury in a district police mortuary in eastern India. **Materials and Methods:** An autopsy-based cross-sectional study was conducted from 1st March, 2021 to 28th February, 2022 in the department of Forensic Medicine & Toxicology, JIMSH Medical College, Budge Budge, Kolkata. During this period total number of 2116 autopsies were carried out in the district police mortuary, Kolkata. **Result and Conclusion:** Out of these 288 cases were associated with burn injury among which 100 burn injury cases were selected randomly and analyzed. The majority of deaths (34%) occurred between 21 yrs to 30 yrs age group with preponderance of female (89%), maximum number of patients (33%) died within 2-5 days of following burn injury. The majority of burn incidence (57%) were accidental in nature.

INTRODUCTION

Burn injuries are an under-appreciated trauma that can affect anyone, anytime and anywhere. The injuries can be caused by friction, cold, heat, radiation, chemical or electric sources, but the majority of burn injuries are caused by heat from hot liquids, solids or fire. Mankind has been dealing with thermal injuries for thousands of years, yet. Fire was perhaps man's first double-edged sword, as it has developed as well as destroyed mankind. Burn injuries the common manifestation of fire are one of the leading causes of death in all medico-legal cases in India. About 60,000 people suffer from burns annually in India, more than 50,000 come to hospitals and about 10,000 succumb to thermal injuries.^[1] India is the only country in the world where fire is classified among the fifteen leading causes of death in 1998 standing fourteenth in the list.^[2] They are the 4th most common type of trauma worldwide, following traffic accidents; falls and interpersonal violence.^[3] According to the World Health Organization, 238,000 individuals died of fire-related burns in 2000, and 95% of these deaths occurred in low and middle-income countries.^[4,5]

MATERIALS AND METHODS

Our present study is retrospective autopsy-based cross-sectional study. It was conducted from 1st March, 2021 to 28th February, 2022 in the department of Forensic Medicine & Toxicology, JIMSH Medical College, Budge Budge, Kolkata and total 100 cases with burn injuries was chosen randomly out of 288 cases for autopsy used as a material for study purpose. The information regarding age, sex, residence, occupation, time of incidence etc. was gathered from the district police mortuary record book and police inquest reports, hospital records, etc.

Meticulous and complete postmortem examination was conducted over all the bodies autopsied with attempts made to establish the cause and circumstances leading to death. Decomposed and grossly charred bodies were excluded in this study. Tabulation, data and statistical analysis was done in the department of Forensic Medicine.

RESULTS

A total of 2116 medico-legal autopsies were conducted by the department during the period of

study. Deaths due to burns comprised of 288 (13.6%) cases. The age group of 21-30 years accounted for the maximum number of cases (34%), followed by the age group 10-20 years 24% cases and then by 31-40 years 21% cases. [Table 1]

Out of 100 cases in the present study, 12 cases were Male (12%) and 88 cases were female (88%), which reflects a male: female ratio of 1:7.33 [Table 2].

The place of occurrence of burn injury of the deceased as per the inquest reports prepared by the I.O, were mostly occurred at In-Law's house 75% cases. In 19% cases injuries occurred at paternal house, 5% cases at workplace & 1% case at unknown place. [Table 3]

Maximum number of burn incidences i.e. 35% occurred at 12.01-18.00 hrs; followed by 31% cases at 6.01-12.00 hrs. The number of incidences are 26% in between 18.01-23.59 hrs & minimum 8% at 00.00-6.00 hrs. [Figure 1]

A peculiar finding of the present study is that, if distribution of study population is compared between manner of death & factors causing burn injury, the majority of cases (57%) are accidental in nature which corroborates with the findings of stove burst (30%) & catch fire during cooking or prayer (23%). Next common circumstances of death are suicidal (39%) cases which tallies with the causative factor pouring kerosene oil (39%). [Table 4 & Figure 2]

Regarding the period of survivability, the majority of deaths 33% cases due to burn occurred within 2-5 days followed by 29% cases in 6-10 days, 23% cases in <1day, 10% cases in 11-20 days, 3% cases in >30 days and minimum 2% cases in 21-30 days. [Table 5]

From the study it was observed that the major cause of death due to burn was neurogenic shock in 54% cases, followed by Septicemia & pneumonia (23%), asphyxia and inhalation injury (12%), Hypovolemic shock and Toxemia (7%) and multi-organ failure (4%). [Table 6]

Out of 100 cases in the present study in 37 cases (37%), total body surface area involved was more than 70% but less than 90%, in 34 cases (34%) burned area was more than 50% but less than 70%, followed by 13 cases (13%) involved area more than 30% but less than 50% and the percentage of burned area was less than 30 in only 7 cases (7%), and in 9 cases (9%) almost whole body surface area i.e., more than 90% was injured [Figure 3].

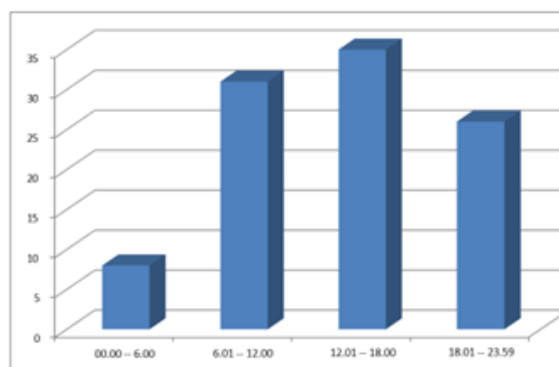


Figure 1: Cases according to the time of burn injury (n=100)

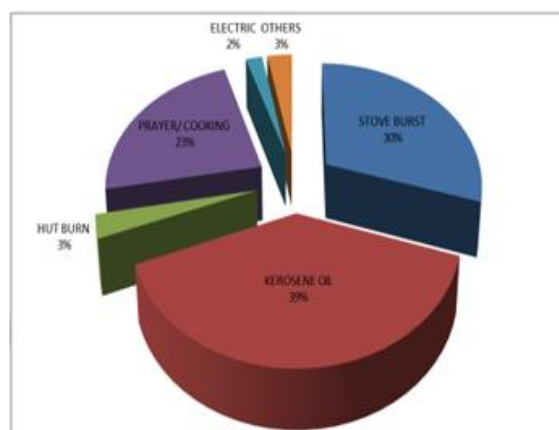


Figure 2: Cases according to the factors causing burn injury (n=100)

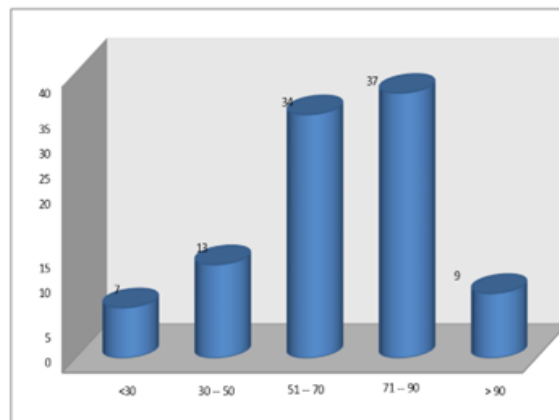


Figure 3: Cases according to the percentage of body surface area burnt (n=100)

Table 1: Distribution of the study population according to the age (n=100).

Age group (in years)	Number of cases	Percentage (%)
< 10	1(2)	1(2)
10 to 20	24(22)	24(22)
21 to 30	34(32)	34(32)
31 to 40	21(23)	21(23)
41 to 50	5(6)	5(6)
51 to 60	6(7)	6(7)
>60	9(8)	9(8)
Total	100	100

Table 2: Distribution of study population according to sex (n=100)

Total Autopsy	Sex	Number of burn cases	Percentage (%)
2116	Male	55	19.09

	Female	233	80.91
	Total	288	100
100 cases selected randomly out of 288 cases	Male	12	12
	Female	88	88
	Total	100	100

Table 3: Distribution of cases according to the place of occurrence (n=100)

Place of occurrence	Number of cases	Percentage (%)
Paternal house	19	19
In-Law's house	75	75
Workplace	5	5
Others	1	1
Total	100	100

Table 4: Distribution of study population according to the manner of death (n=100).

Manner of death	Number of cases	Percentage (%)
Accidental	57	57
Suicidal	39	39
Homicidal	1	1
Unknown	3	3
Total	100	100

Table 5: Distribution of study population according to the period of survivability (n=100)

Period of survivability	Number of cases	Percentage (%)
< 1 Day	23	23
2--5 Days	33	33
6-- 10 Days	29	29
11-20 Days	10	10
21--30 Days	2	2
>30 Days	3	3

Table 6: Distribution of study population according to Cause of burn death

Cause of Death	Number of cases	Percentage
Neurogenic Shock	54	54
Septicemia and Pneumonia	23	23
Asphyxia	12	12
Hypovolemic shock and Toxemia	7	7
Multiorgan failure	4	4

DISCUSSION

So, the study reflects the fact that the majority of deaths due to burn injury between 10yrs to 40yrs of age (79%), with peak incidence in 21 to 30yrs (34%) of age group. Moreover, it closely tallies with the observations of N.P. Zanjad et.al (2007) & S. Sevitt.^[6,7] Singh et al,^[8] reported that most burn deaths occurred in the age group of 21-40 years (66.1%), with female preponderance (61%) in all age groups except in the extreme age groups.

Out of 100 cases in the present study, 12 cases are Male (12%) and 88 cases are female (88%), which reflects a male:female ratio of 1:7.33 and during the period March 2021 to 28th February 2022, 288 cases of burn death of which 233 were females and 55 were males; having the female: male ratio of 4.6:1 In the similar study, N.P. Zanjad et.al (2007),^[6] observed male:female ratio of 1:2.5, S.Sevitt^[7] observed male: female ratio 1:1.59, which is not close to the observation in the present study [Table-2]. Singh et al,^[8] reported that most burn deaths occurred in female (61%) in all age groups except in the extreme age groups. Similar findings was observed in studies in Delhi,^[9] Maharashtra,^[10] West Bengal,^[11] suggesting 'female dominance'. It is a very well-

known fact that women are more susceptible to burn injury than men due to their place of work that is the kitchen where they are to spend a big time for the purpose of cooking foods and making tea etc.

Table-3 shown that the place of occurrence of burn injury of the deceased as per the inquest reports, mostly occurred at In-Law's house 75% cases. This reflects the circumstances of death of women with the accidental and suicidal in nature and also reflects the preponderance of dowry-deaths that are still prevalent in the rural area of West Bengal.

[Figure 1] shown that the time of burn injury i.e. maximum number of incidence 35% occurred at 12.01-18.00hrs; followed by 31% cases at 6.01-12.00hrs. So, the study reflects the fact the majority of incidents happened at the day time in between 6.00hrs & 18.00hrs when people are usually engaged in domestic works in kitchen and professional works in factory.

Regarding the period of survivability Table-5 shown that 33% cases, patients died within 2-5days following burn injury due to epidermal to dermoepidermal burn which were most painful resulting in neurogenic shock, followed by 29% cases in 6-10days. But the interesting fact that the most of the 33 cases died during that period(2-5days) when secondary shock due to fluid loss from the burned

surface is the commonest cause of death according to most of the authors of different standard textbooks.^[12-14] Similarly, Virendra et al also reported death from burns within a week in 60.8% victims. Next common period of death is 6-10 days which corresponds to the time when toxemia and sepsis are the most important factor of deaths,^[15-17] and 23 cases died within 24hrs of burn injury, some of them are brought dead cases and rest died few hours after admission in the hospital which corresponds to the causes of death like primary (neurogenic) shock and smoke inhalation.^[12] A peculiar finding of the present study is that, if distribution of study population is compared between Table-4 (manner of death) & [Figure 2] (factors causing burn injury), the majority of cases (57%) are accidental in nature corroborating with the findings of stove burst (30%) & catch fire during cooking or prayer (23%). Next common circumstances of death are suicidal (39%) cases tallies with the causative factor pouring kerosene oil (39%). Moreover, it closely matches up with the observation of N.P.Zanjad et.al (2007).^[6]

[Figure 3] shown in 37% cases total body surface area involved was more than 70% but less than 90%, in 34% cases burned area was more than 50% but less than 70%, followed by 13% cases involved area more than 30% but less than 50% and the percentage of burned area was less than 30 in only 7% cases and in 9 cases (9%) almost whole body surface area i.e., more than 90% was injured. In the similar study, N.P. Zanjad et al (2007),^[6] observed in 189 cases (41.4%), total body surface area involved was more than 80% which is very close to the observation in the present study.

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