

A Prospective Study of Burn Deaths with Special Reference to Manner of Death and Duration of SurvivalManoj T M¹, Dhanya Raveendran², Dipu Mohan³¹Assistant Professor & Assistant Police Surgeon, Department of Forensic Medicine, Government Medical College, Thiruvananthapuram, India²Assistant Professor & Assistant Police Surgeon, Department of Forensic Medicine, Government Medical College, Thiruvananthapuram, India³Assistant Professor & Assistant Police Surgeon, Department of Forensic Medicine, Government Medical College, Kollam, India

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Abstract:**Background:** Approximately 5000 individuals every year succumb to death from burns, accounting for roughly 2 million hospital admissions. The amount of the total body surface area affected is a crucial factor that influences the outcome in burn cases. Most fire-related fatalities are unintentional, typically the result of negligence. Suicidal burns are more common in women and in household settings. Homicidal burns are uncommon; they are typically caused by acts of retaliation or criminal concealment.**Objective:** This study sought to determine the method of death in burn cases, as well as the amount of body surface area affected, survival time, and length of hospital stay.**Materials and Methods:** A year-long descriptive study was carried out in the Departments of Forensic Medicine and Pathology, Government Medical College, Thiruvananthapuram, Kerala, India. The study took place between February 2012 and February 2013. Inclusion criteria constituted all post-mortem cases brought with alleged history of burns whereas exclusion criteria constituted dead bodies with burns brought in any stage of decomposition and burns due to electrocution and radiation. Study variables including demographics data (age, gender, height, nutritional status, marital status, occupation, educational status and the socioeconomic status of the deceased) and clinical history data (cause of burn, percentage of body surface area involved, degree of burns, period of survival and the complications if any that aroused during the hospital stay) was captured in the study proforma. Autopsy of all the study subjects (n=100) was conducted by the Modified Rokitansky method.**Result:** In the age category of 20 to 29 years, there were the most instances (30%), with 28 females and 2 males. Suicide accounted for the majority of instances (58%), with accidental deaths coming in second with 37% of occurrences. Homicidal burns were seen in 4 cases. The period of survival in majority of the cases (27%) was between 1 to 3 days. This was followed by 26 cases and 21 cases in whom the period of survival was <1 day and 3 to 7 days, respectively. There were 6 cases in whom the period of survival was >28 days.**Conclusion:** The bulk of these cases (84%) involved females and had burn injuries ranging from 51% to more than 90% of the body surface area (BSA). Hospital stays of one to seven days were recorded in 48% of cases. Of the instances, 26% of the deaths occurred within a day. The bulk of deaths were suicide (58%), then accidents (37%), and the fewest were homicidal (4%).**Keywords:** Burn; India; Death; Survival.

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Introduction

Burns are considered as a serious public health problem globally. Injuries due to burns are among the commonest causes of unnatural death so they have a tremendous medico-legal importance. [1] Low- and middle-income nations account for the majority of these fatalities.

The three key demographic characteristics linked to an increased risk of burn injuries are poverty,

illiteracy, and high population density. [2] A database maintained by the Ministry of Health and Family Welfare, Government of India, indicates that every year over 70 lakh Indians suffer from mild to severe burns.

These numbers provide an indication of the impact burn cases have on India's healthcare system. Because of their high frequency, burns are a

chronic health risk. The care, reporting, and prevention of burn injuries are complicated by the interaction of social, economic, and cultural variables. [3] The most crucial factor influencing the prognosis in a burn damage scenario is the extent of the body surface area affected. Significant fluid loss occurs, which can lead to shock if more than 20% of the body is affected—more than 50% of the body is typically deadly. Generally speaking, in current Indian circumstances, involvement of approximately one-third (33%) of the entire body surface area is considered to have a severe prognosis and sufficient in the ordinary course of nature to cause death. [4,5]

Aiming to determine the cause of mortality in burn patients, the current study sought to measure the total body surface area injured, as well as the duration of survival and hospital stay.

Method

A year-long descriptive study was carried out in the departments of Forensic Medicine and Pathology, Government Medical College, Thiruvananthapuram, Kerala, India. The study took place between February 2012 and February 2013. Inclusion criteria constituted all post-mortem cases brought

with alleged history of burns whereas exclusion criteria constituted dead bodies with burns brought in any stage of decomposition and burns due to electrocution and radiation. Study variables including demographics data (age, gender, height, nutritional status, marital status, occupation, educational status and the socioeconomic status of the deceased) and clinical history data (What caused the burn, how much of the body was burned, how severe the burns were, how long the patient survived, and any issues that arose while they were in the hospital) was captured in the study proforma.

Autopsy of all the study subjects (n=100) was conducted by the Modified Rokitansky method.

Statistical Analysis

SPSS programme (version 17.0) was used to conduct a descriptive statistical analysis after the data was gathered, coded, and recorded on a Microsoft Excel spreadsheet programme.

Results and Discussion

There were 100 instances in the study population, with twenty-two being male and seventy-eight being female. Table 1 below provides a gender and age-based description of the instances.

Table 1: Distribution of cases according to gender and age

Age in years	Gender		Total Number of cases (%)
	Male	Female	
	Number of cases (%)	Number of cases (%)	
Less than 20	0 (0)	6 (7.7)	6 (6)
20-29	2 (9.1)	28 (35.9)	30 (30)
30-39	5 (22.7)	13 (16.7)	18 (18)
40-49	3 (13.6)	9 (11.5)	12 (12)
50-59	5 (22.7)	5 (6.4)	10 (10)
60-69	5 (22.7)	5 (6.4)	10 (10)
70-79	1 (4.5)	5 (6.4)	6 (6)
>80	1 (4.5)	7 (9)	8 (8)
Total	22 (100)	78 (100)	100 (100)

The age range of the victims in this research was 16 to 84 years old. In the age category of 20 to 29 years, there were the most instances (30%), with 28 females and 2 males. In the 50–59 age range, ten instances were reported, five of which were female and five of which were male. Five of the ten victims, who were all between the ages of 60 and

69, were males. There were six girls in the age category under twenty. Thus, the majority of victims were female across all age categories, with the exception of the 50–69 age range, when the distribution of victims was similar between males and females.

Table 2: Distribution of cases according to Percentage of Body Surface Area (BSA) affected by Burns

Percentage of BSA affected by burns (%)	Frequency	Percent
< 30	0	0
31-50	16	16.0
51-70	29	29.0
71-90	28	28.0
> 90	27	27.0
Total	100	100.0

In this study, the majority of the subjects—29 (29.00%)—had burn injuries that covered between 51 and 70% of the body surface area (BSA), Table

2. These cases were followed by 28 and 27 instances, which covered between 71 and 90% and more of the BSA, respectively. A total of < 30% of

the BSA was not covered by burn injuries in any cases. This discovery was comparable to the research conducted by Harish D et al. (2023), which found that 22% (85) of the victims had burn injuries encompassing 61–70% of their body surface area, with 71–80% BSA present in 17% (64) of the cases. 73.84% of the instances involved more than 80% of the body's surface area, according to Memchoubi and H. Nabachandra (2022). [7]

The majority of victims, according to Mazumder A and Patowary A (2023) [8], had burn injuries that

affected 90–100% of their body's surface area, closely followed by injuries that affected 50–60% of the same area. Of 133 instances (56.12%), 51 to 75% suffered burns, according to Buchade D et al. (2021). [9]

Only 20 instances (6.67%) had the implicated body surface area being less than 40%, according to Mangal HM et al. (2022) [10]. Of the 232 cases (77.33%), >50% of the body surface area was burned, and 48 cases (16%) had 40–50% of the body surface area burned.

Table 3: Distribution of cases in accordance with period of survival

Period of survival	Frequency	Percent
<1 day	26	26
1-3 days	27	27
3-7 days	21	21
8-14 days	3	3
15-28 days	2	2
>28 days	6	6
Not known	15	15
Total	100	100

In the current study, the majority of subjects (27%) had survival duration of one to three days. After that, there were 26 instances and 21 cases, respectively, whose survival periods were less than a day and three to seven days respectively.

In six of the instances, the survival span exceeded 28 days, Table 3. Comparably, Harish D et al. (2023) [6] noted that 31 instances (8%) died within the first 24 hours of receiving burn injuries, whereas the bulk of subjects (102, 24%) survived for more than a week before passing away.

In their study, Chaudhary BL et al. (2023) [11] found that 57 (27.53%) burn victims died immediately and were pronounced brought dead in the hospital, whereas 150 (72.46%) individuals died in the hospital after being admitted during the

course of therapy. Following a burn injury, 42 instances (20.28%) had a survival time of 7 to 15 days, whereas 39 cases (18.84%) had a survival period of 3 to 7 days. In a single instance, the longest time of survival was 59 days.

Conversely, Memchoubi and H. Nabachandra (2022) [7] found in their study that 21.53% of patients lived for more than a week, whereas 49.23% of victims passed away within an hour after suffering burns. 40% of victims died within a few minutes and 24 hours after suffering burns, 24% died within a week, and 20% died within two weeks, according to Chawla R et al.'s (2021) [12] research.

Of those, 12% passed away in less than three weeks, Table 4.

Table 4: Distribution of cases on the basis of Manner of Infliction of burns

Manner of death	Frequency	Percent
Accidental	37	37.0
Suicidal	58	58.0
Homicidal	4	4.0
Undetermined	1	1.0
Total	100	100.0

Discussion

Drawing from various sources such as medical records, police reports, testimonies from family members and witnesses, and post-mortem examinations, it was determined that suicidal behaviour accounted for the majority of deaths (58 out of 100 instances, or 58%), with accidental deaths coming in second (37%). There were four incidences of homicidal burns. The current study's findings are consistent with those of Chaudhary BL

et al. (2023) [11], who found that 72.94% of cases included unintentional burns, with suicidal thoughts occurring in 17.39% of cases and homicidal thoughts in 9.66% of cases. According to Buchade D et al. (2021) [9], the most frequent way that burns occur is accidental in 147 (62.02%) instances, followed by suicide in 62 (26.16%) and homicidal in 28 (11.82%) cases.

Mangal HM et al. (2022) [10] studied 300 cases and found that, among burn victims, the majority

died accidentally in 183 instances (61%), followed by suicide in 105 cases (35%), and homicidal in just 12 cases (4%). Das KC (2020) [13] and Bangal RS (2021) [14] made comparable observations. It is exceedingly difficult to determine if a burn injury was caused accidentally, by suicide, or by homicide without the presence of an eyewitness. Sometimes the sole evidence proving homicidal intent is the Dying Declaration, which is extremely difficult to gather because of the victim's unconsciousness, the police's incompetence, or their ignorance. The increased frequency of unintentional fatalities, particularly among women, may be because to their employment in domestic cookery; suicidal events may come from marital maladjustment leading to suicide cases or bride burning instances because of dowry disputes.

Conclusion

Based on the current investigation, it is clear that the majority of patients (84%), with burn injuries encompassing 51 to >90% of the body surface area (BSA), were female. Hospital stays of one to seven days were recorded in 48% of cases. Of the instances, 26% of the deaths occurred within a day. The bulk of deaths were suicide (58%), followed by accidents (37%), and homicides (4%) in the lowest percentage of cases. The survival rate for people with burns that are less than 60% BSA and without major comorbidities has significantly improved with modern burn therapy. However, there is still more work to be done to meet the goals. It is imperative that the general public be made aware of the safety measures that should be taken when handling fire and those professionals provide counseling to help individuals manage their innate anger and raise awareness. Ethical Clearance was obtained from the Institutional Ethical Committee of Government Medical College, Thiruvananthapuram vide certificate No: IEC No: 02/38/2012.MCT dated 16/2/2012

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