Original Research Article

The pattern of Injuries in burn cases – An Autopsy Study at a tertiary care center in Eastern Maharashtra Region.

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Abstract:
Burn is one of the leading causes of death in India. Burn cases are one of the most common cases that autopsy surgeons encounter during the examination of a Medicolegal Autopsy. It is commonly seen in newly married women with suicidal, accidental, or homicidal intentions; hence, it has a social impact and is also of medicolegal importance for the agency investigating the crime.
The present study aims to discover the pattern of burn injury and various factors that influence and result in causing the burn injury.
The study is based on observation and findings from post-mortem examination of burned deceased brought to the Mortuary of the medical college. The data is analyzed using various demographic and socioeconomic factors, including causative factors for burn injury. All parameters were compared with multiple research articles published in the standard journal on similar matters, and a conclusion was drawn after that.
The present study shows flame burns, involvement of female sex, married women, accidental burn injury, and rural residence as commonly associated factors in case of burn injury.

Key Words: Burn Injury, Medicolegal Autopsy, Manner of death

Introduction:

According to WHO, burning is a Global problem, and every year, around 1, 80,000 deaths occur globally due to burning every year. Most of the cases are from low-income and middle-income group countries. In India, 10,00,000 people suffer minor to significant burn injuries every year. [1] Females are generally at higher risk in burn cases. Burn cases have severe economic and social impacts on the country. It is also one of the common occupational hazards. Burns are preventable by applying proper preventable strategies and proper care of affected people.
The present study will focus on the demographic, socioeconomic, and medicolegal aspects of burn injury cases. This will help find out influential factors, patterns, and distribution of burn injuries and plan preventive measures to avoid such incidences.

Aims & Objective:

- To study the demographic profile and pattern of burn injury to find out the influential factors that contribute to burn injury.
- To suggest remedial measures to avoid burn injury.

Material and Methods:

The study is retrospective. It is based on a postmortem examination done at the medical college mortuary. The study includes cases of burn injury on which a post-mortem examination was done at the Mortuary attached to the Department of Forensic Medicine in a tertiary medical college. Only those cases with a history of burns are taken into consideration. A total of 64 cases are taken into consideration for one year (2023-2024).

Information like demographic patterns and history regarding incidence was collected from the police investigation report, and data was presented in the postmortem examination report, which was narrated by the patient's relative at the time of the postmortem examination. For determining the manner of death, Information given by police, information provided by relatives of the deceased, and post-mortem findings are considered. The data was collected based on various parameters like age, sex, marital status, residential pattern, percentage of Burn, manner of death, cause of death, and form of heat causing burn injury. The obtained data is then compared with data from various research articles published in standard journals, and a conclusion is drawn afterward.

Results:

In the present study, the maximum number of victims, 34 (53.1%), were in the age group of 21-30 years, followed by 18 (28.1%) cases in the age group of 31-40 years. Female cases, 52 (81.2%) outnumbered the males 12 (18.7%) cases. (Table -1)

In the present study, out of 64 cases of burns, 56 (87.5%) cases were married, and only 8 (12.5%) cases were unmarried. (Table-2)

In the present study, out of 64 cases, 36 (56.2%) are from ru.33.ral areas, and 28 (43.7%) are from urban areas. (Table -3)

In the present study, out of 64 cases of burns, 2 (3.1%) cases had < 25 % burns, followed by 14 (21.8%) cases having 26-50 % burn, 30 (46.87%) cases having 51-75% burns and 18 (28.12%) having > 75% burns. (Table -4)

Considering the Manner of Death, out of 64 cases, 2 (3.1%) cases were Homicidal, 18 (28.12%) cases were suicidal, and 44 (68.75%) cases were accidental. (Table -5)

Considering the cause of death out of 64 cases, Burn injury was the immediate cause of Death in 14(21.8%); however, in 50 (78.2%), Burn was an Underlying cause of Death. (Table - 6)Considering the form of heat causing burn injury, in the present study, out of 64 cases, 61 (96.9%) cases resulted from Flame burn, and in 2 (3.1%) cases, the cause was electrocution. (Table – 7)

Case Distributions according to age and sex: (N=64)

Table – 1

Age In Years	Male	Female	Total (%)
<10	-	-	0
11-20	0	6	6 (9.3%)
21-30	4	30	34 (53.1%)
31-40	8	10	18 (28.1%)
41-50	0	2	2 (3.1%)
>50	0	4	4 (6.2%)
Total	**12 (18.75%)**	**52 (81.25%)**	**64**

Case Distributions according to marital status: (N=64)

Table – 2

Marital Status	Male	Female	Total
Married	10	46	56 (87.5%)
Unmarried	2	6	8 (12.5%)
Total	12	52	64 (100%)

Case Distribution according to the Urban/Rural pattern (N= 64)

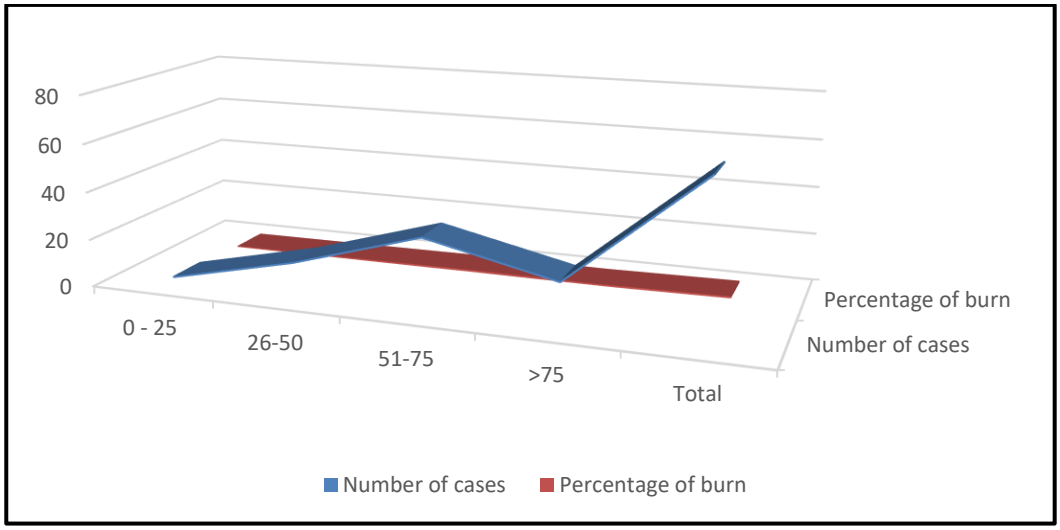
Table – 3

Burn case with Urban Residence	Burn Case with Rural Residence	Total
28 (43.7%)	36 (56.2%)	64

Case Distributions according to Percentage of Burns: (N=64)

Table – 4

% of Burn	Number of cases	Percentage
0 - 25	2	3.1%
26-50	14	21.8%
51-75	30	46.8%
>75	18	28.1%
Total	64	100%

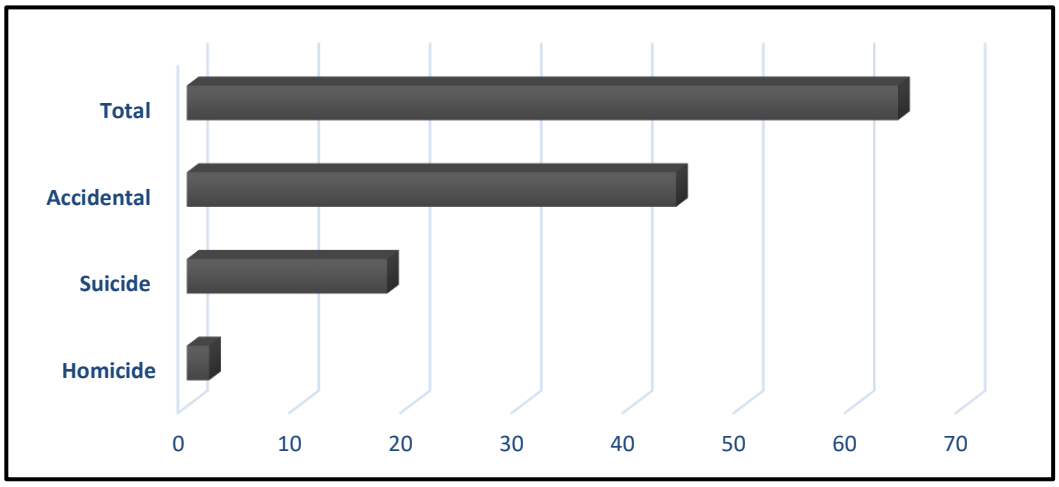


Graph Referring Table - 4

Case Distribution according to Manner of Death: (N = 64)

Table – 5

Manner of Death	**Cases**
Homicide	2 (3.1%)
Suicide	18 (28.12%)
Accidental	44 (68.75%)
Total	64



Graph Referring to Table 5

Case Distribution according to Burn as the immediate cause of Death (N=64)

Table 6

Cause of Death	**No. of Case**
Burn as Immediate cause of Death	14(21.8%)
Burn as Underlying Cause of Death	50 (78.2%)
Total	64 (100%)

Case Distribution according to form of Heat causing burn injury: (N = 64)

Table – 7

Manner of Death	**Cases**
Flame	62 (96.9%)
Electrocution	2 (3.1%)
Total	64

Discussion:

The present study shows a maximum number of incidences in the age group of 21-30 years (53.1% cases) followed by the age group of 31-40 years (28.1%). So, the age group of 20- 40 years together comprises 81% of cases. Our observations match a study by PK Mishra et al., which shows 21-30 years (45.3%) is the most involved age group, followed by 31-40 years, i.e. (31.6%). [2] Similarly, a study conducted by Jaiswal AK et al.[3] shows similar findings to our study where 79% of individual out of total cases was between 15-45 years of age group. Our study shows that females (81.2%) are highly outnumbered by males (18.2%) in burn cases. Also, our study shows married individuals (87.5%) are more likely to burn injuries than unmarried (12.5%). These findings are similar to the PK Mishra et al. survey, where most victims were married (80%), and 73.7% were females[2]. The same finding regarding the joint involvement of the 21-30 age group, female sex predominance, and joint participation of married women are seen in the study by Debbarma S[4].

The reason for the more common involvement of the Age group 21-40 years could be that this age group is more productive and active. At this age, males and females are involved in many stressful and hazardous situations at home and in the workplace. Women are more commonly succumbed to burn injury because, at this age, they get newly married and are under stressful situations due to various social and cultural problems. Also, the women are exposed to burns as they are more in contact with fire due to cooking and related activities. This is the age at which most males and females get married; hence, the involvement of married people is expected.

Considering the residential pattern, our study shows burn cases are more common in rural regions (56.2%) than urban regions (43.7%). This finding is similar to various studies conducted in India on this matter.[3,5,6.]

Reasons for the common involvement of rural areas could be various; people in rural areas are more exposed to burns due to traditional cooking methods like stoves and challah, the use and

availability of kerosene at home, and conventional socio-cultural issues. Also, early medical access is needed to initiate immediate treatment.

75% of cases from our study show involvement of more than 50% of total body surface area due to burn injury. A similar finding is evident from a survey by Devesh Pataria et al.[7], where more than 75% of cases involve more than 50% of the total body surface area due to burn injuries. Our study contradicts the findings of BH Tirpude[6] et al., where the maximum number of cases involved less than 25% of the total body surface area due to burns.

As the present study contains data from dead cases, the injury would have been fatal, and hence, involvement in more body surface area is joint in our research and a study by Devesh Pataria[7]. However, the survey done by BH Tirpude[6] et al. includes live cases, and hence, it includes all minor to major burn injuries reported to the causality department; hence, the findings would have been different. A Study done at Jaipur suggests that involvement of more than 40% of total body surface area due to burns results in more than 80% mortality in the victim of burn[8]. This suggests that the involvement of more body surface area is commonly seen in death due to burns, and it is a significant influencing factor leading to death in burn victims, i.e., the higher the percentage of burns, the more familiar the chances of death.

Regarding the manner of death, our study shows a maximum number of cases, i.e.44 (68.75%), were accidental, followed by suicidal and Homicidal. Similar was the finding from the survey by Davesh Pataria et al.[7], Buchade et al. [9] & Mangal HM [10] et al., where the most common manner of death is accidentally followed by suicide and then homicidal.

The reasons for the above findings regarding the manner of death could be that the data is based on the alleged history given by the patient and relatives of the patient. The patient or his relatives often hide the truth and tell that the incident occurred accidentally to avoid legal action. There is a limitation in concluding the manner of death from postmortem examination, especially between accidental and suicidal manner. Another cause for more accidental burns could be that women are more exposed to burns due to cooking activity. Traditional cooking methods and kerosene at home for cooking and lighting purposes are commonly seen in rural areas. Hence, rural women are more exposed to accidental burns.

Regarding the cause of death, our study shows there are various immediate causes leading to death, and burn remains the underlying cause of death in 50 (78.2%) cases, and death occurs directly due to burn seen in 14(21.8%) cases. The most common causes leading to death are septicemia, pneumonia, and acute respiratory distress syndrome. In a study from Lucknow, India, sepsis is shown as the most common cause of death [11.]

Data from our study shows in most cases, Burn is a secondary cause of death, and death occurs due to various complications like sepsis, multi-organ failure, etc. In addition, the contributing factors could be the lack of early access to treatment, poor healthcare infrastructure, etc.

Burn injury is caused by various forms of heat, such as dry heat, moist heat, friction burn, corrosive Burn, electrocution, etc.[12] However, in our study, dry heat is the main causative form of heat, i.e., Flame burns in 62 (96.9%) cases, followed by Electrocution in only 2 (3.1%) cases. As per findings from an autopsy-based study done in Nepal[13, the] most commonly causing form of

heat is Flame burn. So, our study's findings match the findings of this study regarding this matter.

The association of flame burn injury as more common could be due to contact with fire while cooking at home or the workplace. Flame burn causes extensive damage in terms of total body surface area percentage, resulting in more mortality. Other forms of heat, like moist heat, get protection from body clothes; electric Burn is an occupational hazard and not seen so commonly as a flame burn injury.

Conclusion:

- Our study suggests that married females are commonly involved in burn injury, rural people are at more risk, most of the cases are accidental, and flame burn is the most common cause. The study also suggests that death in burn cases is caused by various factors like sepsis and complications resulting from the burn injury.
- The number of deaths from burn injuries can be reduced by the development of good healthcare infrastructure across the country, which is easily accessible to all & especially to rural areas, as rural people are at higher risk. Early treatment can reduce fatality by preventing the spread of bacterial infection and other complications leading to death.
- People should adopt safer cooking methods like L.P.G. gas, induction stoves, etc. Women should be made aware of this.
- More focus should be given to the education and empowerment of girls and employment in rural areas because most of the victims are female, and rural area shows more cases.
- Newly married women are commonly succumbed to burn Injuries. Hence, the government should employ various policies to stop the violence against freshly married women, which should include strict implementation of the laws regarding violence against women, creating awareness in society for respecting women, identification of high-risk cases, and psychological counseling of such newly married women by trained doctors whenever needed, a helpline to provide immediate protection from violence, etc.
- To avoid electrocution-related burn injury, proper safety measures should be taken by the people employed in this occupation.
- Proper adoption of preventive policy will reduce the incidence and number of deaths in case of burn injury.

Conflict of Interest: Nil

Funding - Nil

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