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Original Article

An Epidemiological Burns Autopsy Study Along with its Source and Severity in a Tertiary Care Hospital

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ABSTRACT

Background: Burns have always been considered as one of the most destructive injuries, causing not only deaths but also major economic and psychological impacts. This study has been taken up to characterize the epidemiology and to know the trend of the changing profile of the burn deaths. **Materials and Methods:** A total of 50 cases of death due to fatal burn injuries, which were brought to the mortuary of BPS GMCW, Khanpur Kalan, Sonipat, Haryana, India, between January 2013 and December 2015, were taken up for the study. **Results:** In the present, study of young women in age category of 21–30 years living in rural areas was commonly involved. Maximum number of victims were married and were housewives. Flames were most common physical agent for burn injuries in 74% of cases, whereas electrical injuries were seen in 26% cases. Maximum number of cases occurred during night-time (46%) especially around 7–8 PM or early morning. Most common manner of deaths was accident. **Conclusion:** This study helps to highlight the trends and to identify the various risks factors of fatal burn injuries.

Keywords: Burns, Epidemiology, Injuries, Flames, Electrical, Autopsy

INTRODUCTION

Injuries are an increasing number of recognized public health problems, extensively affecting almost every population and geographical region of the world. Burns have always been considered as one of the most destructive injuries, causing not only deaths but also major economic and psychological impacts and long-term somatic sequelae as well burn injury is a common type of traumatic injury, causing considerable morbidity and mortality [1].

Burns are a worldwide public health problem, accounting for predicted 180,000 deaths annually. The majority of those arise in developing nations and nearly thirds arise within the WHO African and South-East Asia regions. In India, over one million human beings suffer burn injuries each year. For 2000, direct charges for care of youngsters with burns inside the United States of America surpassed US$ 211 million. In Norway, charges for health centre burn control in 2007 surpassed 10.5 million pounds. Indirect charges inclusive of lost

wages, extended care of deformities and emotional trauma, and commitment of family resources, additionally make contributions to the socioeconomic impact [2].

A burn occurs when some or all of the cells in the skin or other tissues are destroyed by hot liquids (scalds), hot solids (contact burns) or flames (flame burns). Injuries to the skin or any other organs or tissues due to contact with corrosives, chemical, electricity, radiation or friction are also identified as burns [3].

A significant proportion of these cases are contributed by thermal burns [4]. The use of fire in various aspects has not only added to comforts, but also added to miseries by increasing the risk of burns [5]. Injuries may be intentional or non-intentional, but intent is sometimes difficult to determine for injuries such as burns [6].

The preventable nature of the burn deaths, the environmental elements related to it and the age group involved makes an observed evaluating socio-demographic profile and stressful life events of sufferers who have intentional burn demise compared with patients who have non-intentional burn death essential [7]. Epidemiological studies must be performed in order to get more information for prevention programmes, for their design and implementation [8]. This study has been taken up to characterize the epidemiology and to know the trend of the changing profile of the burn deaths.

AIM AND OBJECTIVES

To evaluate the demographic profile, causes and the magnitude of the fatal burn injuries retrospectively.

MATERIAL AND METHODS

It was a 3-year retrospective study on burn deaths in north-eastern region of Haryana, which were medico-legally autopsied in the mortuary of Department of Forensic Medicine and Toxicology BPS GMC for Women, Khanpur Kalan, Sonipat. Burn death cases from the total autopsies performed during the period of 2013–2015 were cases of interest irrespective of manner of death and type of burn. An in-depth examination of the various epidemiological parameters and medicolegal aspects of these deaths due to fatal burns was performed with a view to apprehend the dynamics surrounding these deaths more clearly. Retrospective data were collected from the autopsy reports of the Institute and the inquest reports from police. All the records revealed various information pertaining to their age, sex, marital status, residence and location of accident, types of burn, manner of death, total body surface area (TBSA) burns and source of injury were studied. Entry of the collected data was done into Microsoft excel spread sheet. Percentage and proportions were calculated for qualitative data.

RESULTS

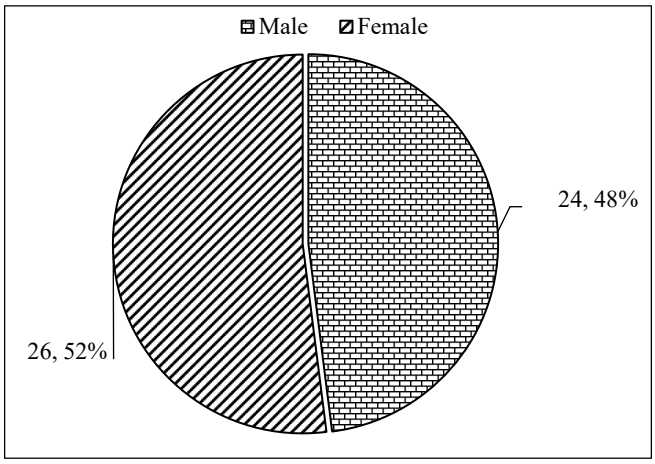
A total of 50 cases of fatal burn injury were autopsied in the mortuary of BPS GMC for Women, Khanpur Kalan, Sonipat, during January 2013 to December 2015.

Gender and Age: Death due to burns was more common in females than males, it accounted for 52% of the cases. Death due to burns was more common in young age groups (that is, 20–40 years) which accounted for 54% of deaths, whereas the incidence decreased in the extremes of ages being minimal in less than 10 years and above 60 years of age (Tables 1 and 2; Graph 1 and 2).

Marital Status: 64% of the cases were married and 32% were unmarried (Table 3 and Graph 3).

Table 1: Gender-wise distribution of cases

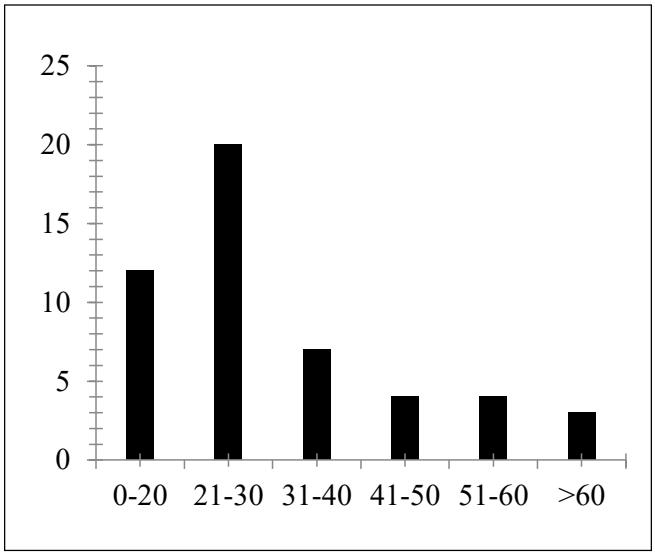
Gender	Frequency	Percentage
Male	24	48%
Female	26	52%
Total	50	100%



Graph 1: Gender-wise distribution of cases

Table 2: Age-wise distribution of cases

Age groups (years)	Frequency	Percentage
0–20	12	24%
21–30	20	40%
31–40	07	14%
41–50	04	08%
51–60	04	08%
>60	03	06%
Total	50	100%



Graph 2: Age-wise distribution of cases

Table 3: Marital status-wise distribution of cases

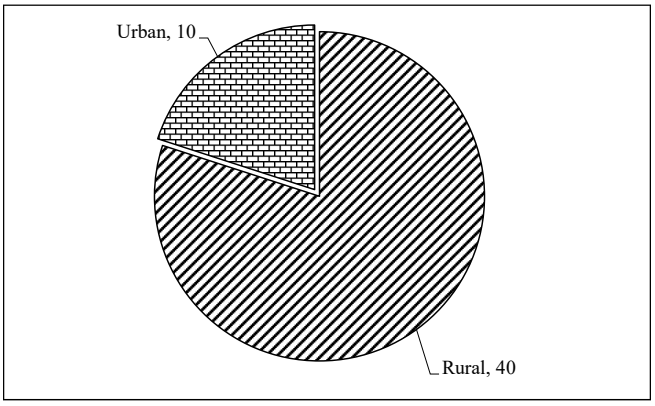
Marital status	Frequency	Percentage
Married	32	64%
Unmarried	16	32%
Widower	02	04%
Total	50	100%

Graph 3: Marital status-wise distribution of cases

Place of burn: The incidence of death due to burn was more common in rural areas (80%) as compared with urban area (Table 4 and Graph 4).

Table 4: Residence-wise distribution of cases

Residence	Frequency	Percentage
Rural	40	80%
Urban	10	20%
Total	50	100%

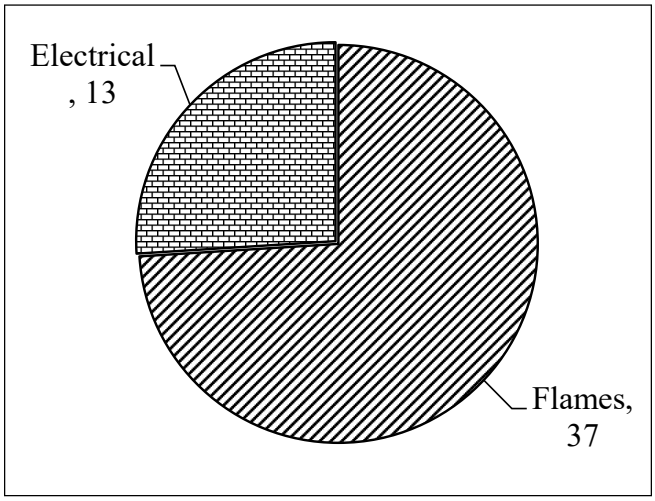


Graph 4: Residence-wise distribution of cases

Cause of Burn: Flames were the most common type of burns seen in deaths due to burn injuries. It accounted for 74% of death due to burn injuries, whereas electrical burn injuries accounted for 26% of deaths (Table 5 and Graph 5).

Table 5: Type of burn-wise distribution of cases

Type of burn	Frequency	Percentage
Flames	37	74%
Electrical	13	26%
Total	50	100%

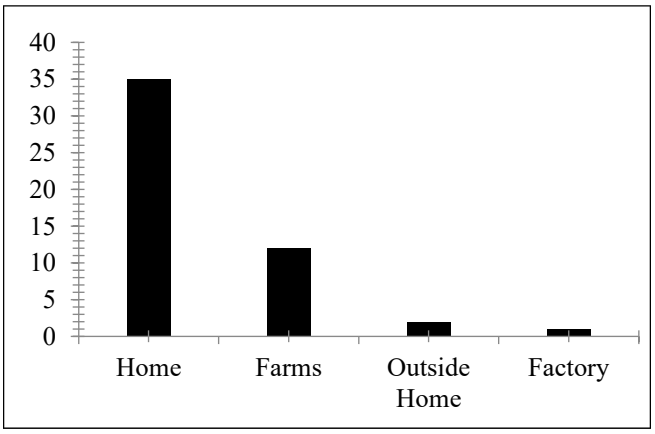


Graph 5: Type of burn-wise distribution of cases

Place of Incidence: Death due to burn injuries occurs mostly at home (70%) followed by farms (24%), outside home and least common at workplace (Table 6 and Graph 6).

Table 6: Place of incident-wise distribution of cases

Place of incident	Frequency	Percentage
Home	35	70%
Farms	12	24%
Outside home	02	04%
Factory	01	02%
Total	50	100%

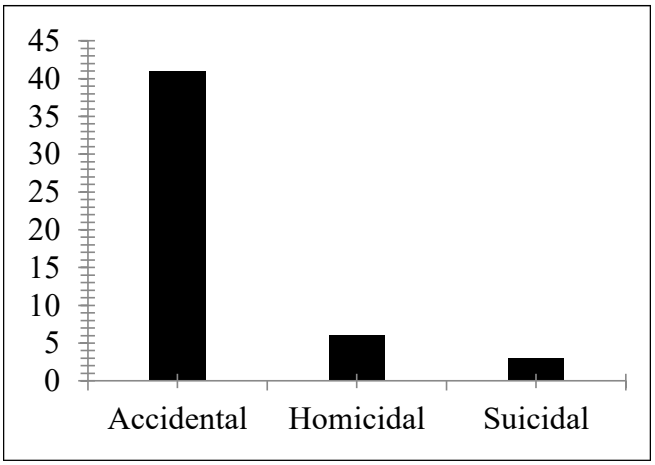


Graph 6: Place of incident-wise distribution of cases

Manner of Death: Accident was most common manner of death due to burn injuries, which accounted for 82% of total deaths due to burns. It was followed by homicidal burn (12%) and least in suicide (06%) cases (Table 7 and Graph 7).

Table 7: Distribution of cases on the basis of manner of death

Manner of death	Frequency	Percentage
Accidental	41	82%
Homicidal	06	12%
Suicidal	03	06%
Total	50	100%

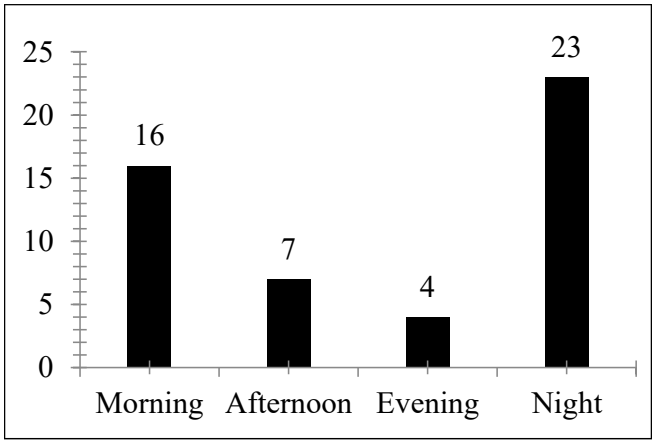


Graph 7: Distribution of cases on the basis of manner of death

Time of Incidence: Incidence of death due to burns was more common during the night-time (46%) and least in the evening (08%; Table 8 and Graph 8).

Table 8: Distribution of cases on the basis of time of incidence

Time of incident	Frequency	Percentage
Morning	16	32%
Afternoon	07	14%
Evening	04	08%
Night	23	46%
Total	50	100%



Graph 8: Distribution of cases on the basis of time of incidence

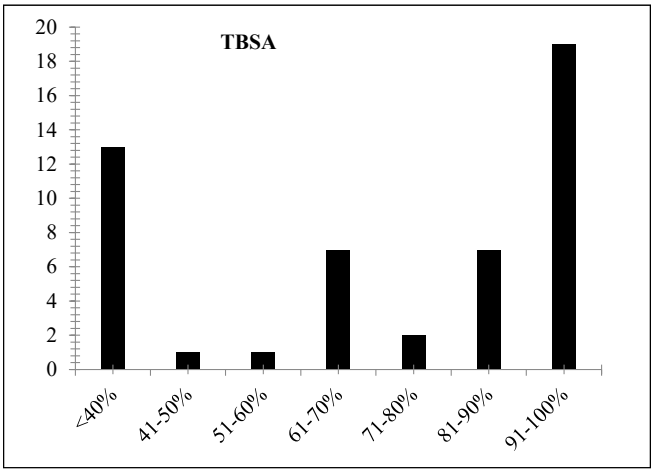
Total Body Surface Area Burns: Considering <40% of TBSA as cut-off point to describe severity of burn, only 26% of cases suffered <40% of TBSA with burn and died. Severe burn injuries were found more commonly in female cases, that is, ≥80% TBSA burns. Among total female autopsied cases about three-fourths (actual 73%) were severely burnt, whereas only 29% autopsied male were severely burnt (Table 9 and Graph 9).

Source of Burns: Kerosene stove (48%) was the most common source of death due to flame burn injuries, whereas tube well (22%) was most common source of electrical burn injuries (Table 10 and Graph 10).

Table 9: Distribution of cases on the basis of TBSA burn

TBSA	Frequency	Percentage
<40%	13	26%
41%–50%	01	02%
51%–60%	01	02%
61%–70%	07	14%
71%–80%	02	04%
81%–90%	07	14%
91%–100%	19	38%
Total	50	100%

Abbreviation: TBSA, total body surface area.



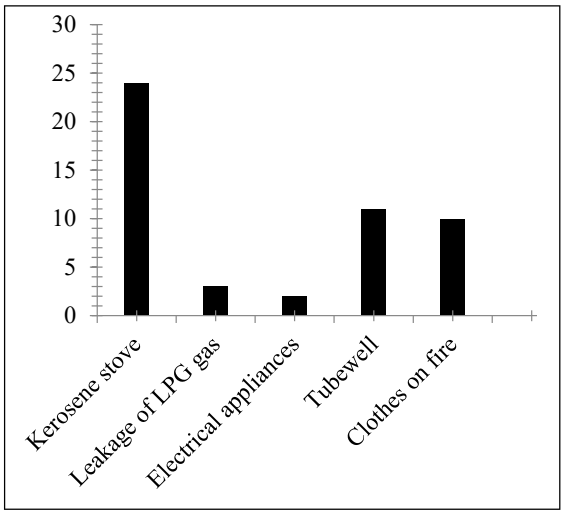
Graph 9: Distribution of cases on the basis of total body surface area burn

Table 10: Source-wise distribution of cases

Source	Frequency	Percentage
Kerosene stove	24	48%
Leakage of LPG gas	03	06%
Electrical appliances	02	04%
Tube well	11	22%
Clothes on fire	10	20%
Total	50	100%

DISCUSSION AND CONCLUSION

Death due to fatal burn injury is always a burning issue considering its social and economic impacts over the society. Death due to thermal burns is a burning topic



Graph 10: Source-wise distribution of cases

Picture 3: Showing burns due to friction

Picture 1: Showing completely charred body due to flames

Picture 4: Showing Deep burns and charring due to flames

Picture 2: Showing burns due to electricity

Picture 5: Showing superficial burns due to flames

all over the globe, however, deaths due to burn injuries is more prevalent in developing countries than developed countries [2].

In the present study, young age women in the age category of 21–30 years living in rural areas were commonly involved. Maximum number of victims were married and were housewives. Similar sex predispositions were also seen over others states of the country. This finding is consistent with previous studies conducted by Sharma *et al.,* [9] Ambade and Godbole [10], Batra [11], Zanjad and Godbole [12], Singh *et al.* [13] and Chawla *et al.* [14]. This study is in contrast to the studies done outside India, which showed higher incidence in male population. This was seen in the study done by Saleh *et al.* [15] about 70% were males, and by Nikerk *et al.* [16] in which 60% population were of males.

Majority of burn injuries occurred at home (70%). Place of incidence and sex were found to be significantly associated. Most of the death in house occurred in kitchen and mainly in females, whereas deaths in males mostly occurred at farms where they work.

Flame and electric current were responsible for deaths due to burn. Flames were most common physical agent for burn injuries in 74% of cases, whereas electrical injuries were seen in 26% of cases. In the present study, almost every female suffered burn injury due to flames. Findings of this study are consistent with Zanjad and Godbole [12] and Koulapur *et al.* [17]. A study conducted by Navarate and Rodrigues [8] showed that electricity as most common cause of burn injury, which was in contrast with the present study. The electrical injuries occurred mostly at farms where there are open electrical wires and motors for tube wells.

The present study shows proneness of young population to hazards of fire. This is the most active group of people where the females who have more preponderance, which may be due to cooking practice using wood and kerosene oil. The housewives work in the kitchen with the hazard of being accidentally exposed to the open fire. The use of an open and unguarded fire while cooking is very common in the low socio-economic, agricultural and rural Indian society due to the cost factor and low availability of resources. Also newly married females belonging to this age group are more likely to become victims of dowry death. Females outnumbered males in all age groups except in 0–20 years and 61–70 years age groups. This is consistent with study done by Deshpande *et al.* [18] This may be due to the fact that among children and elderly population, both sexes are equally and occasionally exposed to burn injuries.

In the present study, the majority of the patients suffered from accidental burn injuries (82%) followed by homicidal and suicidal, respectively. The findings in this study are consistent with Dasari *et al.* [19]; Bhansalli *et al.* [4]; Kumar and Verma [7] which showed that highest number of death were accidental in nature.

Considering 40% of TBSA burns as cut-off point for describing the severity of burn injuries, only 26% of deceased suffered from <40% TBSA burns, whereas 74% people suffered >40% TBSA burns and died. Severe burn injuries were found more commonly in female cases, that is, $\geq$80% TBSA burns. In the present study, majority of people (38%) suffered almost complete body surface area burn (90%–100%). The study conducted by Harish [18] states that majority of victims (22%) suffered 61%–70% TBSA burns followed by 71%–80% TBSA burns in 17% of cases.

In the present study, maximum number of cases occurred during night-time (46%) especially around 7–8 PM or early morning, as this is usual time of cooking by housewives in India. These findings are consistent with study done by Vidate and Pathak [20]. Majority of males in rural area suffered from burn injuries during early mornings as they were involved in supplying water to the crops.

The present study highlights the trends in deaths due to burn injuries. This study helps to identify the various risks factors of fatal burn injuries, thereby can help in

addressing the issues so, that they can be prevented and also help the authorities in taking proper preventive measures and early management of fatal burn injuries.

Source of Funding: Nil.

Conflict of Interest: None.

Ethical Approval: Not applicable as it is retrospective study and no living subjects were involved. This has the approval of the head of the institution. There is no chance of identification of the subjects in the present investigation.

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