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# A Two Year Demographic and Medicolegal Study of Burn Cases in V.M.M.C & Safdarjung Hospital, New Delhi - Original Research Paper

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**Abstract:** ***The etiological factors causing a fatal burn injury are demographically multifarious. In the present study conducted on 300 burn autopsies from Delhi- NCR region, and on cases referred from UP and Haryana, it was deduced that the majority of cases were married Hindu females in the age group of 21-30 years, most of whom suffered the burn injuries at home while allegedly cooking. In majority of the female victims, the burn injury covered 61-90 % of the total body surface area followed by more than 91% of the total body surface area. In children of the age group 0-5 years, scald burn was the prevalent type of burn injury, where the usual area of distribution was abdomen, the corresponding area of back and both lower limbs.***

**Keywords:** burn, demographic, medicolegal, dowry, female, scald, children

## 1. Introduction

Agni, the most popular god of the Rigveda, whose importance is next only to Indra, is the primary recipient of all offerings to Gods and Vedic sacrifices and this is perhaps one of the reasons why despite the excruciatingly painful death, self immolation is chosen as a means of committing suicide by Indian women . More often, however, it is a powerful means of protest to bring to attention their plight. According to WHO, about 2, 65, 000 deaths occur each year from fires alone globally. The majority of these deaths occur in low- and middle-income countries. In India around 7 million people suffer from burn injuries each year with 1.4 lakh deaths and 2.4 lakh people suffering from disability [1].

The reasons are many like; poverty, overcrowding, illiteracy, lack of proper safety measures for liquefied petroleum gas and electricity, cultural foundation of wearing loose and hazardously long garments like duppata and saree, young girls doing cooking and care of small children, unsupervised children playing in the kitchen where there is no platform to keep cooking appliances, use of kerosene (paraffin) as a fuel source for domestic purpose, easy access to kerosene, petrol and acid for assault, false history given by family members resulting in no proper implementation of laws related to burn injuries and deaths.

## 2. Material and Methods

The present study is a prospective study of 300 burn victim autopsies conducted from July 2016 to January 2018 in the mortuary of VMMC & Safdarjung hospital, New Delhi. A pre designed proforma was used to collect data in which the following parameters were studied: Sex, age and religion distribution; gender based comparative study of marital status, manner of death, agent used, rural and urban distribution of cases, place of occurrence & percentage of burn surface area; correlation of duration of survival with percentage of burn and gender; type and distribution of burn in children in the age group 0-5 years.

## 3. Observation & Results

During the study period, a total of 300 burn victim autopsies were studied, of which female victims formed the bulk comprising of 210 burn victims( 70 %), rest being male (30%) (Figure 1). Most of the victims belonged to the age group 21-30 years which amounted to 44.4 % of total males studied and 47.6 % of total female cases. The lowest numbers of the cases were reported in the category of above 61yrs. (Graph 1). In the present study most of the victims belonged to the Hindu community comprising 262 cases (82 male, 180 female) out of the 300 cases studied during the study period, the rest were from Muslim community (Graph 2). In males the majority were unmarried comprising of 53% of total male burn victims whereas the reverse was true in case of females where married females comprised of a whopping 84% of the total female burn victims. (Figure 2)

As for the manner of death, accidental burns topped the list with 212 cases (84% in males and 72 % in females) the next common was suicidal deaths in males (11%) whilst homicidal deaths was the next common in females (16%)

(Figure 3, 4). The causes of death amongst the two genders widely varied even if, the manner of death remained the same. In females kerosene was the commonest culprit agent causing burn injury followed by LPG (in 94 and 86 cases respectively out of 210 female burn victims), whereas LPG and electrical were the commonest agents in males (34 and 18 cases respectively out of 90 male cases) (Graph 3)

51% of the total burn victims belonged to urban area and the rest were from rural area (Figure 5). The place of occurrence of burn injuries was home in case of 92% of


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the female victims which was the location for only 42 % of the total male victims (Figure 6).

In most of the female victims, the burn injury covered 61-90 % (the majority of whom survived to a maximum of 7-14 days) of the total body surface area followed by more than 91% of the total body surface area whereas in male victims it was 31-60 % (the majority of whom survived a maximum of 7-14 days) followed by 61-90% (Graph 4, Table 1, 2)

Our study shows that scald burn was the commonest type of burn in children of age group 0-5 years comprising of 86 % of the total cases in this age group. Abdomen, back and both lower limbs were the usual areas involved. (Table 3, Figure 7)

## 4. Discussion

In a total of 300 cases of burns, females formed the majority with 70% which is in concurrence with the studies of Chawla et al, Mazumdar et al, Aggarwal and Chandra, Doshi, Ganguly, Sinha et al, Haralkar and Rayate, Naralwar and Meshram [2-9]. The reason may be attributed to the fact that women in India are responsible for the domestic duties including cooking where due to cultural and religious reasons they wear dangerously long and loose fitted clothing. This together with lack of safe installation of cooking appliances that involves chullah, stove burst and gas leakage, making them the more vulnerable gender. The maximum cases of burns were seen in the age group of 21-30 years owing to early marriage and subsequent kitchen responsibilities of female, coupled with suicidal and homicidal dowry deaths post marriage. This amounts to 46.6% of the total cases. No case was reported in the category above 61 years in females which is in agreement with studies by K. C. Das, D. Nath and D. Buchade and group[10-12], Sinha et al [7], Sharma et al [13], Aggarwal and Chandra [4], Haralkar and Rayate [8].

Majority of the burn victims were Hindus (87.3% of the total burn victims) which is similar to the findings of Mazumdar et al, Reddy, K.C. Das, D. Nath P.Singh[ 3, 10, 11, 14]. The reason being Hinduism is the largest religion practised in India.

In the present study, urban habitation comprised of 51% cases while the rural habitation was noted in 49% cases which is in concurrence with a study by Chawla et al [2]. This may be attributed to rapid urbanisation and migration to urban areas, but still belonging to lower socio economic strata which thus results in poor literacy rates and persistence of the same kitchen appliances like chullah and shegdi in a urban setting. However, Sinha et al [7], Haralkar and Rayate [8] observed high incidence in rural habitat.

Our study shows that, 92% of the total female victims were at home at the time of incidence as opposed to 42% of male victims. This is consistent with conclusions drawn by Mazumdar et al, Aggarwal and Chandra [3, 4], Haralkar and Rayate [8] observed in their study that majority of the female burn victims were housewives. The reason can be attributed to burn accidents which may occur while cooking, suicides and homicides being at home due to easy accessibility to combustible substance in the kitchen and absence of witnesses, religious-cultural beliefs and dowry deaths.

The domestic violence can be further supported by the marital status of the genders in this study in which, the majority of the female burn victims were married (84%) and the 53% of the total male victims were unmarried. The manner of death in females in the present study was accidental in 72% case followed by homicidal in 16% of the cases and suicidal in 12%. The alleged causes of death were fall of dibya, LPG gas leak, pouring of kerosene oil on self, and in dying declaration obtained in the homicidal cases, was of setting on fire by husband or his relatives. Amongst male victims, accidental death occurred more commonly in factory setting or while cooking (84%), homicidal (due to personal enmity or by unknown people )(05%) and 11% was suicidal. Aggarwal and Chandra [4], described commonest method of committing suicide using kerosene oil. Haralkar and Rayate [8], in their study observed that burns were more common in housewives than other occupation. Narlawar and Meshram [9] observed that kerosene stove flames was major cause of burn due to which females burned 2.04 times more frequently than males.

The majority of the burn injuries were of $3^{rd}$-$4^{th}$ degree (Wilson classification of burn injuries) which is in concurrence with Chawla et al [2]

In the present study, maximum percentage of burns, in females was of 61-90% (in 96 cases) and in 52 cases it was more than 91%. In males the majority were in the range of 31-60 %. In the study by Chawla et al [2], 32% of the total cases were in the category of 91-100%. Only 14% cases had sustained less than 50% burns. In the study of Aggarwal and Chandra [4], 42 cases out of 110 case study had involvement of more than 75 % body surface area. Similar observations were seen in study as observed by Sukhai et al [15], Betz et al [16]. Minimum percentage of area leading to burn death in the present study was 1%, even as the duration of survival on correlating with percentage of burn and gender varied hugely where females burnt more than 91 percent survived upto 2 weeks while males burnt less than 30 percent could not survive beyond the initial 24 hours.

In the age group of 0-5 years, scald burn was the cause of death in 12 out of 14 cases. Abdomen, back and both lower limbs were the predominant areas involved. The cause may be accredited to absence of platform in most kitchens in lower socio economic strata, leading to boiling water or other liquids on the ground level where the young children who walk/crawl unsupervised and subsequently fall into the container.

## 5. Conclusion

When we read about fire in the United States, its usually a mass outbreak involving short circuit or forest fire, but in India fire has a more gender biased origin. In a country


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which is primarily rural at roots, steeped in religious beliefs and infested with social evils like dowry, we do not need superior technology to prevent the fires rather; mass education is the need of the hour. Strict and quick implementation of laws related to dowry death and domestic violence, education of doctors and judicial authorities in taking prompt dying declaration to ensure legal action, discontinuing the use of open cooking fires or unsafe cooking stoves, regular prelustration of LPG gas cylinder and electrical circuits, wearing fitted cotton clothing while cooking, use of platform in kitchen, protection of small children around fire and developing a updated and easily accessible burn management infrastructure in India are a few of the many requirements for prevention of a ghastly death.

We misinterpret the purpose of fire.
The Agni Gayatri Mantra enlightens us,

***Om Mahajwalay Vidmahe Agnidevaya Dhimahi |***
***Tanno agni prachodayat ||***

(Let me meditate on the great flame, Oh God Of fire, grant me with higher intellect, illuminate my mind)

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**Conflict of Interest**: Nil

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## Figures, Graphs and Tables

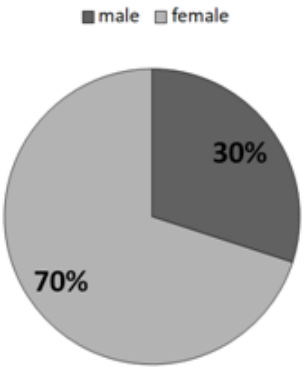



**Figure 1: Sex wise distribution of burn cases**

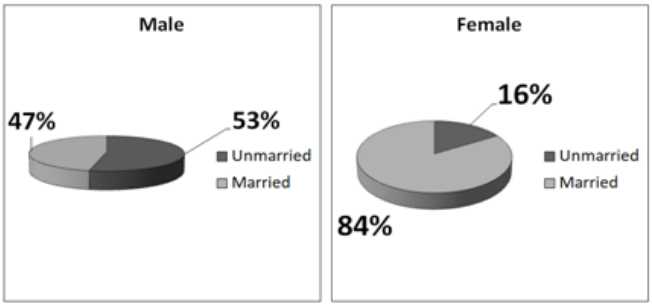



**Figure 2: Marital status of burn victims**


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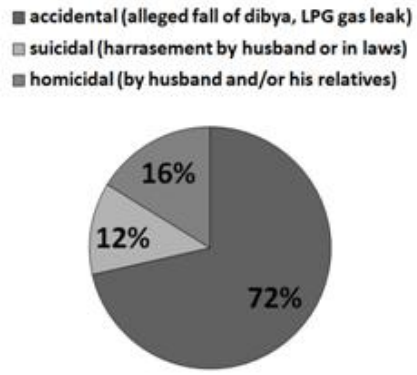



Figure 4: Manner of death in female victims

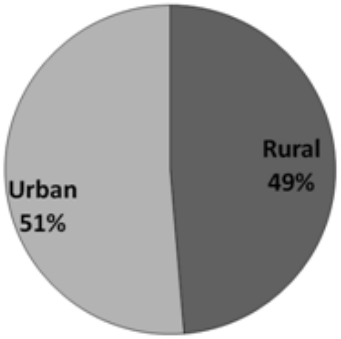



Figure 5: Rural-Urban distribution of burn cases

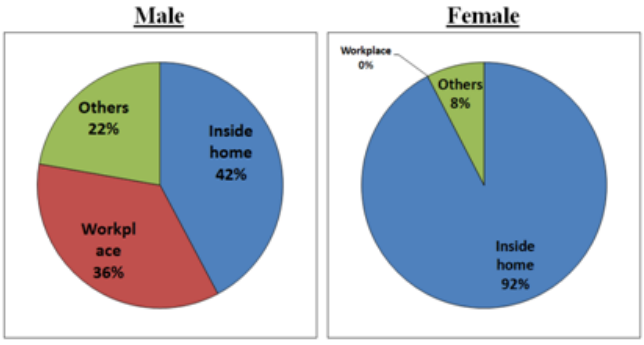



Figure 6: Place of occurrence

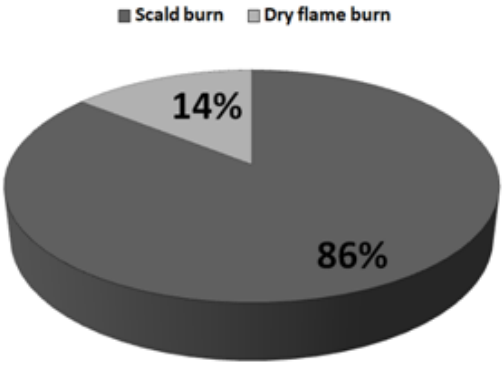
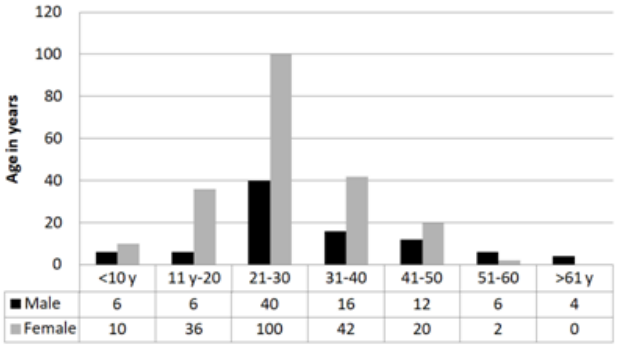
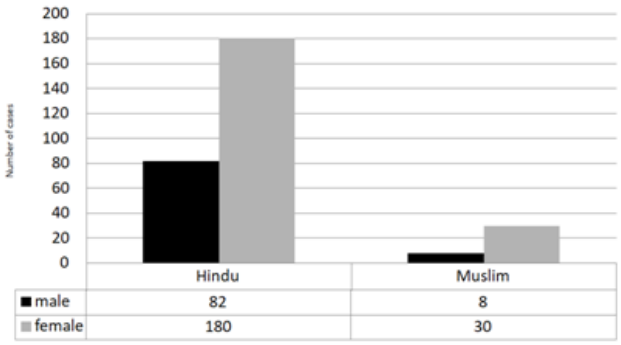


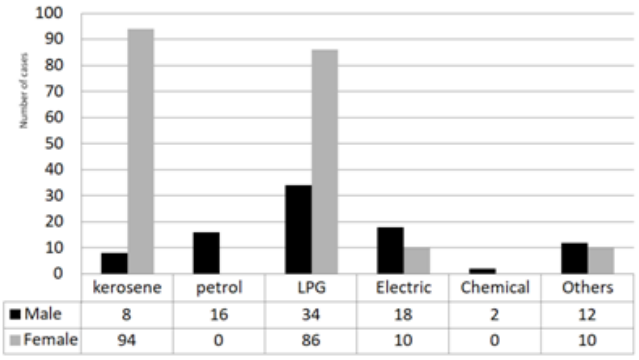

Figure 7: Children in the age group 0-5 years



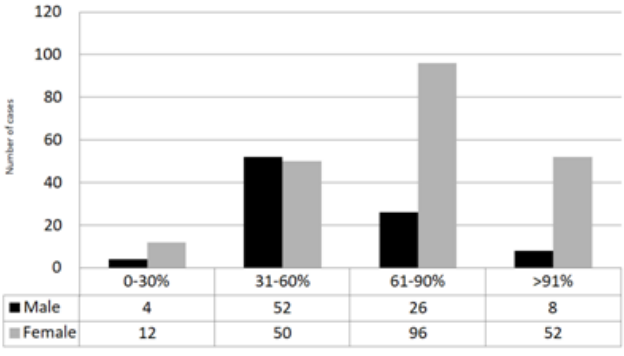

Graph 1 :Age wise distribution of burn cases




Graph 2: Religion wise distribution of burn cases




Graph 3: Agent used in the burn cases




Graph 4: Percentage of total body surface area involved


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**Table 1: Correlating duration of survival with percentage of burn and gender MALE**

| Duration of survival (Death within) | Percentage of Burn | | | |
|---|---|---|---|---|
| | 0-30 | 31-60 | 61-90 | >90 |
| Within 24 hrs | 4 | 2 | 4 | 2 |
| 24-48 hrs | | 2 | | 4 |
| 2-3 days | | 6 | 4 | |
| 3-5 d | 4 | 12 | 2 | |
| 5-7 d | | 10 | 6 | 2 |
| 7-14 d | | 12 | 6 | |
| 14 d- 1 month | | 4 | 4 | |
| More than 1 mth | | 4 | | |

**Table 2: Correlating duration of survival with percentage of burn and gender FEMALE**

| Duration of survival (Death within) | Percentage of Burn | | | |
|---|---|---|---|---|
| | 0-30 | 31-60 | 61-90 | >90 |
| Within 24 hrs | | 8 | 4 | 12 |
| 24-48 hrs | | | 2 | 8 |
| 2-3 days | 2 | 4 | 2 | 4 |
| 3-5 d | 2 | 4 | 14 | 14 |
| 5-7 d | 2 | 8 | 34 | 8 |
| 7-14 d | 2 | 12 | 34 | 6 |
| 14 d- 1 month | 2 | 8 | 4 | |
| More than 1 mth | 2 | 6 | 2 | |

**Table 3: Type and Distribution of burn in children of the age group 0-5 years**
*H- Head, N-neck, C- chest, A- abdomen, UL-Upper limbs, LL-Lower limbs; f-front, b-back

| Age/sex | Dry Flame burn(D)/ Scald burn (S) | Distribution of burn |
|---|---|---|
| 1Y/M | S (fall in hot water) | H,N, (f & b) C |
| 4Y/M | D (LPG gas leak at home) | H,N,C, both UL(f), both LL(f) |
| 4Y/M | S (fall in hot daliya) | A (f &b), both LL (f &b) |
| 1.3Y/F | S(fall in hot chatni) | Whole of back and both LL (b) |
| 1.5Y/F | S(fall in hot kadhi) | A (f &b), both LL (f &b) |
| 3Y/F | S(fall in hot dal) | A(f), whole of back, both UL (b), both LL (f & b) |
| 5Y/F | S(fall in hot water) | C (f&b), A (f&b), whole of both UL |

**Table 3: Type and Distribution of burn in children of the age group 0-5 years contd..**
*H- Head, N-neck, C- chest, A- abdomen, UL-Upper limbs, LL-Lower limbs; f-front, b-back

| Age/sex | Dry Flame burn(D)/ Scald burn (S) | Distribution of burn |
|---|---|---|
| 2Y/M | S (fall in hot water) | H,N, (f & b) C, both UL (f & b) |
| 5 Y/M | D (electric flash burn) | H,N,C, both UL(f &b) |
| 3Y/M | S (fall in hot water) | A (f &b), both LL (f &b) |
| 1.5Y/F | S(fall in hot water) | Whole of back and both UL & LL (b) |
| 1Y/F | S(fall in hot milk) | A (f &b), both thigh (f &b) including buttocks |
| 2Y/F | S(fall in hot milk) | A(f), whole of back, both UL (b), both LL (f & b) |
| 3Y/F | S(fall in hot water) | whole of back, whole of back of both LL |


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