Epidemiological Study of Burn Deaths at a Tertiary Care Centre in Mumbai

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Abstract

Death due to burns is an important cause of unnatural death commonly encountered in Medico-legal Practice. This prospective study was conducted on 100 cases of burn deaths caused by flames, hot liquids and flash of electricity. This study was conducted to know the demographic profiles, common risk factors, causes and manners of death in fatal cases of burns. Most of the cases were in the age group of 21 to 50 years with a peak incidence in 21-30 years age group, with female predominance. In the study, maximum cases were due to kerosene stove blast leading to accidental burns, followed by pouring of kerosene as a source of burn..

Key words *: Burn, autopsy, Kerosene Stove Blast, Accidental Burn*

Introduction

Death due to burns is one of the most important public health problems faced by all nations today. Burns represent an extremely stressful experience for both the burn victims as well as their families. Death due to burning is an important cause of unnatural death commonly encountered in Medico-legal Practice.

In different communities the aetiological factor of burn injuries varies considerably, hence a careful analysis of the epidemiological factors in every community is needed before the planning and implementation of a sound prevention program. This study was conducted to know the demographic profiles, common risk factors, causes and manners of death in fatal cases of burns.

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Materials and Methods

This prospective observational study was carried out on persons who died due to burns and were brought for medicolegal post mortem examination at mortuary of department of Forensic Medicine of a tertiary care centre in Mumbai, during the period of one year and three months i. e. from 1st September 2016 to 30 November 2017.

This prospective study was conducted on 100 cases of burn deaths caused by flames, hot liquids and flash of electricity, after approval from the ethics committee for academic research project.

Primary data, in each case, was collected from inquest report, accidental death report and indoor paper records. The percentage of burn injury was recorded by sketch diagram, photographs for easy understanding and interpretation. The percentage of burns was calculated on the basis of Wallace's rule of nine for adults and Lund and Browder's chart for children.

Results and Discussion

There were 992 medico-legal post-mortem examinations conducted at the Department of Forensic Medicine and Toxicology attached to a tertiary care

centre in Mumbai during the study period. Out of which, 100 (10.28%) cases were of death due to burns. In the present study 100 (10.28 %) cases of death due to burns were included.

Table 1- Age & Sex wise distribution of deceased

Age category	Male	Female	Total No of cases
0 to 10	02	02	04
11 to 20	03	06	09
21 to 30	14	22	36
31 to 40	09	11	20
41 to 50	06	10	16
51 to 60	01	03	04
61 to 70	02	06	08
71 to 80	00	01	01
81 to 90	01	00	01
91 to 100	01	00	01
Total	39	61	100

Most of the cases (72%) were in the age group of 21 to 50 years with the peak incidence in 21-30 years age group, with female predominance. This is similar to the observations of Chawla R et al[1] and Dasari H et al[2]. It shows proneness of the young population to hazards of fire. This is the most active group of people where the females are more concerned with the kitchen hence more chances of sustaining accidental burns. Females outnumbered males in all age groups except in 0-10 and 71-80 age groups. House wives were involved in 45% cases followed by workers in 21% cases, others victims were students, vegetable venders, car washers, garment painting, and farmers. This is consistent with a study done by Deshpande et al.[3] This may be due to the fact that in children and elderly both sexes are equally and occasionally exposed to fire.

Table 2 - Marital Status of deceased

Marital status	**No of cases**	**Male**	**Female**
Married	82	30	52
Unmarried	07	3	4
Not applicable	11	6	5
Total	100	39	61

The data shows that maximum incidence of burn deaths occurred in married people i.e. 82 as compared to unmarried people which is only in 07 cases and 11 cases were below the legal age of marriage. Out of married 82 people, there were 52 females and 30 were males, it shows female predominance. In this study, 36 married females out of total 100 victims died within seven years of marriage. Out of these 36 married females only in one case there was allegation of demand for dowry.

This finding is consistent with Dasari H et al[2] and Tasgaonkar et al[4]. This is an indicator of social problems among married people, especially females, who have all household responsibilities. Also younger and newly married females may become the victim of dowry demand and domestic violence.

Maximum 77 (77 %) incidences occurred inside the house i.e. in close place (kitchen, bedroom, living room), followed by whereas 18 (18 %) were reported outside the house i. e. in open space. 05 (05%) incidences were reported at the workplace. This is because the housewives working in the kitchen are more prone to hazards of fire. Most of the suicidal victims prefer closed spaces like a living room.

Table 3 - Distribution of percentage of burn of deceased & Survival Period

Percentage of burn	Survival period after incidence					
	Less than 24 hours	1 to 7 days	8 to 14 days	15 to 30 days	More than 30 days	No of cases
0 to 20	0	1	3	3	2	9
21 to 40	0	2	4	1	1	8
41 to 60	2	20	12	1	5	40
61 to 80	3	19	3	0	1	26
81 to 100	7	8	1	1	0	17
No of cases	12	50	23	6	9	100

More deaths due to burns 40 (40%) occurred in those who sustained 41 to 60 % of burns, 26 (26%) deaths occurred who sustained 61 to 80 % of burns and 17 (17%) deaths occurred in 81 to 100 % burns. Fewer deaths caused due to burns occurred in 9cases who had sustained 0 to 20 % burns, 8 deaths occurred in those who sustained 21 to 40 % burns. Maximum 50 (50%) people survived for one to seven days after the incidence of burn followed by 23 (23%) who survived for eight to fourteen days and 12 (12%) people survived for less than twenty-four hours. These findings suggest that the more the percentage of burn, less is the survival period and vice versa.

Table 4 - Distribution of source of burn of deceased

Source of burn	No of cases
Kerosene stove blast	35
Pouring Kerosene	22
Electricity flash burn	09
Fire lamp	07
Hot liquid	05
LPG Gas	05
House Fire	04
Fire Wood	04
Boiler Explosion	03
Inverter Battery Blast	02
Hot Milk	02
Fire at Warehouse	01
Cracker Blast	01
Total	100

Kerosene stove blast was leading source of accidental burns in 35 cases, followed by pouring of kerosene as a source of burn in 22 cases. This finding is consistent with Chawla et al.[1]

Maximum deaths due to burns i.e. 91 (91%) occurred were dermo-epidermal type of burns followed by 08 deaths (08%) due to epidermal burns and 01 death (01%) due to deep burns. Out of 100 burn deaths, 97 victims were hospitalized and 3 were brought dead. The nature of burn injuries in all 100 victims was antemortem.

In all types of thermal burns, the upper half of the body was observed to be involved more than the lower half of the body. Similar findings were also observed in a study done by Deshpande et al[3], who observed that anterior and posterior trunk were most commonly affected followed by lower extremity. In a study done by Mustafa F[5], maximum involvement of upper limbs (66.8 %) was observed followed by lower limbs (49.1 %).

Table 5 - Distribution of immediate cause of death

Cause of Death	No of cases
Pneumonia & septicemia	37
Pneumonia	19
Septicemia	20
Neurogenic Shock	11
Hypovolemic shock	06
Others	07
Total	100

It is observed that in maximum 37 cases (37%) the immediate cause of death was pneumonia and septicemia. In 19 cases (19%) the cause of death was pneumonia, 20 cases (20%) it was septicemia, 6 cases died due to hypovolemic shock and 11 cases died due to neurogenic shock. Out of 11 cases, in 08 cases the cause of death was neurogenic shock due to electrocution and in three cases the cause of death was neurogenic shock due to 95 to 100 % burns. The other causes include acute renal failure, acute respiratory failure, shock and suffocation and head injury secondary to electrocution.

Chawla R et al[1] observed 22 % cases died due to primary shock, 10 % died due to oligaemic shock and 56% died due to Septicemic shock and 12 % died due to injuries. Death within the first 72 hours is due to loss of fluid leading to hypovolemic shock. As the survival period and hospital stay increases, chances of infection increases leading to septicemia.

On the contrary, Nath et al[6] observed shock as the cause of majority deaths i. e. 65.74 %, followed by septicemia 28.7 % cases. In a study done by Tasgaonkar et al[4], observed 3.38 % deaths due to Neurogenic shock, 36.38 % cases due to oligaemic shock, 29.54 % cases due to Septicemic shock and 30.46 % cases due to acute tubular necrosis and complications of septicemia.

The manner of death in 78% cases was accidental, 18% cases had committed suicide and 04 % were homicidal in nature. This finding is consistent with Tasgaonkar et al[4] and Buchade et al.[7] This might be due to the fact that maximum victims in the present study were housewives who were more prone to accidental contact to fire while working in the kitchen, particularly in small and crowded houses. This is not consistent with a study of Nath et al[6] which shows maximum burn deaths i.e. 177 (81.94 %) which were suicidal followed by 35 (16.20 %) homicidal and least cases 4 (1.85 %) were accidental.

Conclusion

Females aged between 21 - 40 years are more susceptible to burn injuries. Maximum numbers of victims were housewives and died due to accidental burns. However accidental burn deaths are preventable through a combination of prevention strategies and improvements in the care of people affected by burns. The cases of burns with alleged dowry demand are very low in this study. This may be due to mass and social media in creating awareness among the society regarding laws dealing with dowry death or non-reporting of the dowry issue at the time of post-mortem examination.

Kerosene stove blast was observed to be the most common source of accidental burns. These stoves

provide a very cheap alternative to electric or gas stoves, especially in low socio-economic groups. The accidents are usually due to the fact that the victims do not follow the instructions and do not observe the necessary precautions.

Conflict of Interest - None

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