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Epidemiological study of deaths due to burn injuries in a tertiary care centre of Kalaburagi district

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Abstract: *Introduction:* Injuries due to burns is the fourth most common type of trauma worldwide. In India 7 million people suffer from burn injury, out of which 7 lakh need hospital admission and 2.4 lakh become disabled. Burn injuries have varied aetiological factors. *Aims:* To study the demographic profile of fatal burn deaths, brought to the mortuary of the District Hospital, Kalaburagi and to find preventive and remedial measures to bring down the incidence. *Methodology:* The present study is a retrospective study of autopsies performed at District hospital Kalaburagi from January 2018 to December 2018 to assess the pattern of deaths due to burns. Data was analyzed with respect to the age, gender, manner of death, total body surface area involved, survival period and the cause of death. *Results:* In this study, the majority of deaths due to burns were observed in the age group between 20-40 years maximum cases were in the age group between 21-30 years (50.9%), followed by 31-40 years (27.6%). Female preponderance was seen with 90.2% cases as compared to males with 9.8%.Accidental burning was seen in 21.6% cases followed by suicidal (78.4%).Maximum 51% cases showed total body surface area involvement between 50 – 70%.Maximum survival period was between 24-72hours with 26 cases (51%).The major cause of death was Hypovolaemic shock and Toxaemia 62%cases, followed by Septicemia (21.6%), neurogenic shock in 13.7%, and multi-organ failure in 1.9% cases. *Conclusion:* The present study helps to provide preventive strategies which should address the hazards for specific burn injuries, education for vulnerable populations and training of communities Burn injuries are a serious public health problem with alarmingly high mortality and morbidity. These injuries are preventable through design and promotion of more aggressive prevention programs especially for flame injuries occurring in the home environment.

Keywords: Burns, Septicaemia, Post-mortem examination, Suicidal.

Introduction

In India fatal burns are considered as major health problems that are associated with high mortality and morbidity. Burn injuries have been a major cause of concern since prehistoric days to the present era of modern medicine [1]. Burn is an injury caused by heat, or by a chemical or physical agent having an effect similar to heat [2].

The extent of damage when external heat is applied depends upon the applied temperature, ability of the body surface to conduct away the excess heat and time for which the heat is applied [3]. The minimum temperature for producing burn is about 44 ^{0}C for an exposure of about 5 to 6 hours. At 65 ^{0}C, two seconds are sufficient to produce burns and full thickness destruction of skin occurs within seconds above 70^{0}C [4].

Burns is the 4th most common type of trauma in the world, subsequent traffic accidents, falls, and interpersonal violence. Microbial infection after burns, where a large portion of the skin is damaged, is a very serious complication that often results in the death of the patients. About 45% of the mortality in burns patients is caused by septicaemia [5]. The aim of this study was to observe the profile, causes and the magnitude of the fatal

burn injuries in this region and to find preventive and remedial measures to bring down the incidence due to fatal burn injuries.

Material and Methods

The present study is a retrospective study of autopsies performed at District hospital Kalaburagi from January 2018 to December 2018 to assess the pattern of deaths due to burns. The present study included 51 burn cases, brought for post-mortem examination to the mortuary of Department of Forensic Medicine, District hospital, Kalaburagi. Ethical clearance was obtained from Institutional ethical committee. Relevant information and subjective data like age, sex, residence, marital status, survival period after sustaining the burn, percentage of burn, and manner of death were collected from the relatives, accompanying policeofficial, hospital record of the deceased and postmortem examination in the proforma prepared.

Data was analyzed with respect to the age, gender, manner of death, source of the fire, total body surface area involved and the cause of death. All antemortem burn cases were included in this study. Unknown cases, charred bodies and post-mortem burns were excluded from the study. Data was analysed using excel sheet and statistical calculations done.

Results

A total of 51 cases of fatal burn injuries were autopsied during the period from January 2018 to December 2018.It was observed in the study that maximum number of autopsy cases were in the age group between 20-40 years with maximum cases between 21-30 years (50.9%), followed by 31-40 years (27.6%). Female preponderance was seen with 90.2% cases as compared to males with 9.8%. (table 1)

Table-1: Age and Sex wise distribution of cases

Age (yrs)	Male	Female	Total (%)
1-10	--	--	--
11-20	--	02	02(3.9%)
21-30	01	26	27(52.9%)
31-40	01	14	15(29.5%)
41-50	02	02	04(7.8%)
>50	01	02	03(5.9%)
Total	05	46	51(100%)

From table 2, majority of the cases were suicidal with 40 cases (78.4%) followed by accidental with 11 cases (21.6%)

Table-2: Distribution of cases according to manner of death

Manner of Death	No of cases	Total (%)
Accidental	11	21.6%
Suicidal	40	78.4%
Homicidal	00	00
Total	51	100

From table 3, maximum 40 cases (78.5%) showed total body surface area involvement of burns between 50-90% followed by10 cases (19.6%) with >90% burns.

Table-3: Distribution of cases according to total body surface area involvement

Total Body Surface Area	No of cases	Total (%)
<50%	01	1.9%
50-70%	26	51%
71-90%	14	27.5%
>90%	10	19.6%
Total	51	100

From table 4, maximum cases survived between 24-72 hours with 26 cases (51%) followed by survival period between 3-7 days with 16 cases (31.4%)

Table-4: Distribution of cases according to survival period

Survival period	No of cases	Total (%)
<24 hrs	08	15.7%
24-72hrs	26	51%
3-7days	16	31.4%
>7days	01	1.9%
Total	51	100

From table 5, majority of the cases cause of death was hypovolaemic shock with 32 cases (62.8%) followed by septicaemia with 11 cases (21.6%) and neurogenic shock with 7 cases (13.7%)

Table- 5: Distribution of cases according to cause of death		
Cause of death	**No of cases**	**Total (%)**
Neurogenic shock	07	13.7%
Hypovolaemic shock	32	62.8%
Septicaemia	11	21.6%
Multi organ failure	01	1.9%
Total	51	100

Discussion

Burn is a problem prevalent worldwide [6], especially in developing countries [7]. Based on the available information regarding the incidence of burns and burn deaths, this should be considered as a significant problem in India. In our study about 78% of the victims were in the age group of 20-40 years, which are similar to the observation of Manish et al. [8] and Singh et al. [9] who reported two thirds of fatal burn cases in the young age group (21-40 years). The higher incidence of burn deaths among females (90.2%) was observed throughout the study period as women in childbearing age were reported to be at a higher risk [10].

Burn is the only unnatural cause in which female not only outnumbered the males, but the sex ratio being almost three times higher in female in India [11]. This is mainly because females take care of household work in India, exposed fire more often. The traditional kerosene stove; which is extensively used for cooking and providing the necessary boiling water for bathing; lacks any safety measures. Thus, it is condemned to be responsible for much of the flame and scald burns in our country [12]. Our study corresponds with the findings of other [11-12]. In most of the cases total body surface area burn sustained between 50 to 90%, similar to the observations by Mazumdar A [13], Bhore DV [14].

In our study majority of the cases are suicidal in nature, followed by accidental, this is in contrast with other studies, where accidental burning was the commonest manner of deaths followed by suicidal and homicidal burning [8, 12]. In our study, 51% cases died within 24-72 hours followed by 3-7 days (31.4%), signifying that the burns are rapidly fatal. Similarly Virendra et al [15], also reported death from burns within a week in 60.8% victims.

Our study revealed that signs of vitality (soot in airways and/or digestive tract) were found at autopsy in large majority (89.71%) of victims who died from burns. In the present study, the major cause of death was neurogenic shock and Hypovolaemic shock and toxaemia in 39 cases, followed by Septicemia with 11 cases (21.6%), and Multiorgan failure(1.9%), Which is consistent with the leading cause of death as reported by Manish et al [8] and Virendra et al [15].

Conclusion

The present study highlighted some salient features pertaining to burn deaths in Kalaburagi district. The highest incidence rate of burn deaths was in adolescent group. Majority of the burn victims are females, in childbearing age. Suicide was the commonest manner of death followed by accidental as majority of the female population was from rural areas where in due to financial crisis, poverty and illiteracy people commiting suicide. Hypovolaemic shock and neurogenic shock were the major causes of burn death, followed by Septicemia & Multiorgan failure.

The present study helps to provide preventive strategies which should address the hazards for specific burn injuries, education for vulnerable populations and training of communities Burn injuries are a serious public health problem with alarmingly high mortality and morbidity. These injuries are preventable through design and promotion of more aggressive prevention programs especially for flame injuries occurring in the home environment.

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