

# Profile of the Fatal Burn Deaths from the Varanasi Region, India

RICHA GUPTA, VIKAS KUMAR, S.K.TRIPATHI

## ABSTRACT

**Background:** Burn deaths are a major public health problem in our country. In India, about 60,000 people suffer from burns annually, more than 50,000 are treated in hospitals and about 10,000 succumb to thermal injuries.

**Aims:** To study the demographic and the injury profiles of the burn fatalities which were brought to the mortuary of the Department of Forensic Medicine.

**Subject and Methods:** All the autopsies of the burn victims which were performed between July 2009 and December 2010 were analyzed with respect to the age-gender distribution, religion distribution, marital status, educational status, place of occurrence, source of the fire, survival period, body surface area which was involved and the cause of death. From the observations and the analysis, certain aetiologies were elicited and preventive measures were suggested.

**Results:** A majority of the victims (83%) were females. The maximum number of the victims (59.6%) belonged to the age group of 15 to 30 years, with the least number of victims from

the age groups of  $\geq 45$  years and  $\leq 15$  years i.e. 5.6 % cases respectively. A majority of the victims (98.3%) in this present study cases were Hindus. Most of the victims (83.9%) were married. A majority of the victims (49.2%) had obtained upto primary school level education. The uneducated victims still form a major group, amounting to 15.3% of the burn victims. The maximum number (43.5%) of the burn victims died due to burns which were caused by kerosene oil. Only 0.9% cases were observed, where petrol was used as the inflammable material. In the present study, it was observed that in 39.6 % cases, more than 90% of the body surface area was involved. Only 3.2% of the deceased were seen with burns which involved  $<50\%$  of the body surface area. Septicaemia was observed as a major cause of death (50%) among the deceased.

**Conclusion:** The epidemiological factors of burn injuries vary in different countries. For planning and implementing prevention programs, the approach has to be multi-disciplinary and coordinated.

**Key Words:** Burns, Death, Septicaemia

## INTRODUCTION

Man has invented fire since times immortal. The use of fire in various aspects has not only added to his comforts, but it also added to his miseries by increasing the risk of burns. Since ages, man has paid the price for his comforts in terms of thermal injuries. Since long, fatal burns have continued to be a major public health problem in India. In India, about 60,000 people suffer from burns annually, more than 50,000 are treated in hospitals and about 10,000 succumb to thermal injuries [1]. Microbial infections 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 [2].

Hence, this study was planned with a purpose to know the magnitude and the socio-cultural factors of the problem of burns, so that a sound prevention programme could be suggested, planned and implemented for reducing the incidence of fatal burns.

## MATERIAL AND METHOD

The present study was conducted on burn victims of both the sexes, of different age groups, who were brought into the mortuary of the Department of Forensic Medicine and Toxicology, during the period from July 2009 to December 2010, for a medicolegal post-mortem examination, from various police stations of Varanasi

and surrounding regions. A total of 124 burn cases were selected for an examination of socio-epidemiological features, in an effort to understand the dynamics which surrounded these deaths. The various epidemiological characteristics of the cases were obtained from police papers, post-mortem reports, the investigating officers and the relatives of the deceased. The data was recorded, compiled and analyzed statistically. The research protocol was approved by the local ethical committee and an informed consent was obtained from relatives of each victim prior to his/her inclusion in the study.

## RESULTS

A majority of the victims (83%) were females. The maximum number of the victims (59.6%) belonged to the age group of 15 to 30 years, with the least number of victims in the age groups of  $\geq 45$  years and  $\leq 15$  years i.e. 5.6 % cases respectively [Table/Fig-1]. Further, it was observed that 11.3% victims were in the adolescent age group and that among them, a majority were female victims (78.8%). A majority of the victims (98.3%) in the present study were Hindus. Most of the victims (83.9%) were married and among them (88.5%) were females. Most of the victims (84.6%) were from rural areas and the rest (15.4%) belonged to urban areas. A majority of the victims (49.2%) had obtained upto primary school level education. Uneducated victims still amounting to 15.3% of the

burn victims [Table/Fig-2]. Kitchen was reported to be the major culprit site of the incidence of the burns, accounting for 75 % of the burn incidents, whereas in 13.8% of the cases, the incident had occurred outdoors [Table/Fig-3]. The maximum number (43.5%) of burn victims died due to burns which were caused by kerosene oil. Only 0.9% cases were observed, where petrol was used as the inflammable material [Table/Fig-4]. In the present study, it was observed that in 39.6 % cases, more than 90 % of the body surface area was involved. Only 3.2% of the deceased were seen with burns which involved <50% of the body surface area [Table/Fig-5]. Septicaemia was observed to be a major cause of death (50%) among the deceased [Table/Fig-6].

Age group (in yrs)	No. of cases	Percentage
0 – 15	7	5.6
16 – 30	74	59.6
31 – 45	36	29.2
>45	7	5.6
Total	124	100

[Table/Fig-1]: Distribution of Burn cases in different age groups

Education of the victim	No. of cases	Percentage
Illiterate	19	15.3
Primary	61	49.2
Jr. high school	17	13.7
High school	12	9.7
Intermediate	10	8.1
Graduate	5	4.0
Total	124	100

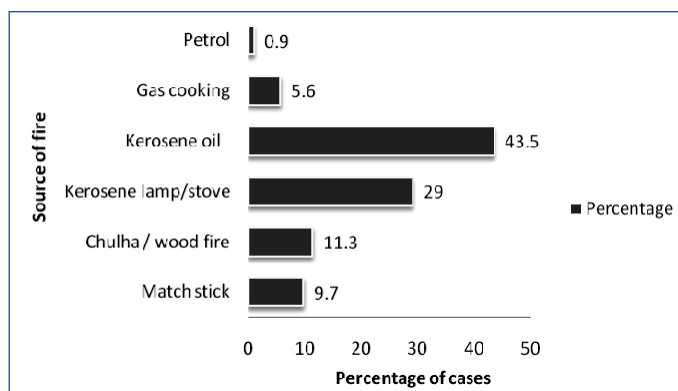
[Table/Fig-2]: Distribution of Studied cases on basis of their education status

Site of incidence	No. of cases	Percentage
Kitchen	93	75.0
Living room	7	5.6
Courtyard	7	5.6
outdoors	17	13.8
Total	124	100

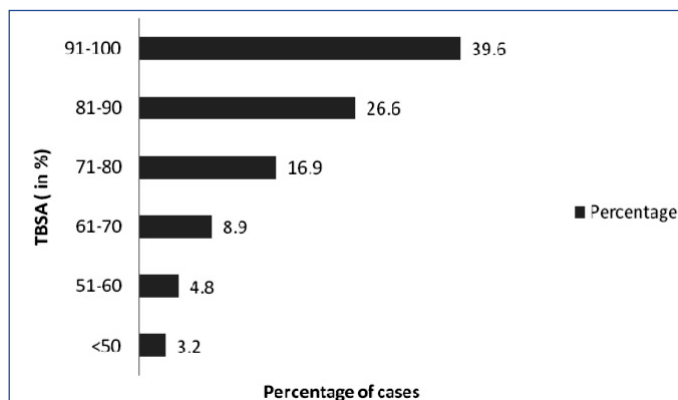
[Table/Fig-3]: Distribution of Burn cases based on site of incidence

## DISCUSSION

Burn injuries occur universally and they have plagued mankind since antiquity, till the present day. In all societies which include those in the developed or in the developing countries, burn pose not only medical and psychological problems, but they also produce severe economic and social consequences on the victims families and also on the society in general. An analysis of the sex record in the present study showed a female preponderance. The overall female predominance in this study conformed to the findings of some previous studies which were conducted in this region [3]. Females were more prone to the burn incidences because of their domestic activities which required an association with fire sources. Moreover, Indian women wore dresses like the sari and the salwar-kamiz with dupatta, which were often of synthetic material, which covered almost the whole body. Such clothes favoured aggravation of the burn injuries. These observations were in concordance with those of other studies from various regions of India [4-6, 8-9]. Some other



[Table/Fig-4]: Bar diagram showing the distribution of Burn cases based on history of fire source



[Table/Fig-5]: Bar Diagram showing distribution of Burn cases according to involvement of body surface area

Cause of Death	No. of cases	Percentage
Septicemic shock	62	50
Burn shock	41	33.0
Toxemia	17	13.7
Acute renal failure	04	3.3
Total	124	100

[Table/Fig- 6]: Distribution of Burn cases in different groups based on Cause of Death

studies, in contrast, showed a male predominance [10-12]. Out of the 124 studied cases, a majority were married victims who were in the 16 to 30 years age group and the least were in the extreme age groups i.e. below 15 years and above 45 years. Amongst the married burn victims, a majority were females. These results are consistent with the findings of other researchers [3, 5-10, 12-14] and they were in contradiction to the findings of the studies from other developed countries [15]. In developing countries like India, the preponderance of the married victims is probably because of the increasing familial stress due to day to day problems like unemployment, illiteracy and poverty, which together give rise to greater issues like marital disharmony and dowry. The unmarried victims group mostly included men of the adolescent age group and the reasons behind their deaths were rivalry, carelessness at the work place and frustration which arose due to a failure in love/ examinations. The present study revealed that the maximum number of victims were from rural areas, which was in accordance with the findings of other studies from various regions of India [5-9, 12-14]. They belonged to the Hindu community mostly and the reason behind this was the Hindu dominant population in the Varanasi region, which was in conformity with the findings of other

previous studies which were carried out in this region [3, 7]. A previous study from the same region had reported nearly equal numbers of victims (54%) from the rural and (46.7%) the urban areas [3]. Burn victims, due to the serious nature of their illnesses and because of medicolegal reasons, are preferably referred to this tertiary hospital. A majority of the victims had upto primary level education, thus reflecting a minor improvement in their education status as compared to the previous studies which were conducted in this region, which reported higher burn incidences among illiterate victims [3, 7]. Although the uneducated victims still amounting (15.3%) but 4.0% of the burn victims were also observed to be graduates. Our findings were in conformity with those of other studies which were done in various other regions [16]. The present study revealed the kitchen as the major site of the burn incidences in comparison to the outdoor incidences. The findings of studies from the same region and also from other regions all over India as well as outside India were in accordance with the findings of this study [7, 17-21]. In contrast, a study from Cambridge reported 57% of the burns to occur at work places, which were employment related [22]. Among the different sources of the fire, kerosene was the main accelerant which accounted for burns. This was probably because kerosene was cheap and easily accessible and because it was included among the household/kitchen materials i.e. the kerosene stove and the kerosene lamp are widely in used by people of the low socioeconomic strata in India, where obsolete and unsafe uses of fire for cooking and light are still prevalent. Similar facts had been previously emphasized in studies from India and other countries [6, 7, 9, 23-24]. In the present study, a majority of the burn deaths were in the victims with >50 % burns and amongst them, the utmost mortality was reported in victims with > 90% of the burnt surface area, thus demonstrating that such an extent of the burn was usually incompatible with the life in India. This was also in accordance with the findings of other studies [3-9, 13]. Septicaemia was observed as a major cause of death (50%) in the present study. This was in accordance with the findings of the studies of other authors [6, 8, 14, 25]. Thus, infection leading to secondary complications and ultimately, multi organ failure was the major cause of death in the burn cases, which could be tackled with the use of better burn care facilities.

## CONCLUSION

The epidemiological factors of the burn injuries vary in different countries. For planning and implementing prevention programs, the approach has to be multi-disciplinary and co-ordinated and this can largely be accomplished by taking the following measures:

- Providing immense amount of education so as to build awareness in the mindset of the general population through school education programs and mass media programmes, with the aim of not only instilling education but also discouraging dowry demands and ostentatious marriage rituals.
- Implementation of strict preventive strategies at high risk work places, so as to prevent fatal burn accidents among the employees.
- The early detection and treatment of microbial infections can reduce the mortality among the burn victims.

- Proper upgradation of the ICUs, burn-units and the transport facilities with recent techniques. Advanced modes of facilities are required to handle all the fatal cases.

So, as long as the problem of deaths by burns persist in India, the government needs to concentrate in this direction and the NGOs, social groups, and the workers need to put in more sincere efforts.

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## REFERENCES

- [1] Patankar P. Clinical and histological overview of burn wound healing, *Dissertation submitted for General Surgery* 1997.
- [2] Dokter J, Boxma H, Oen IM. The mortality and the causes of death at a burn centre. *Burns* 2008; 34: 1103-07.
- [3] Dasgupta SM, Tripathi CB. Burnt wife syndrome. *Annals Acad Med* 1984; 13(1): 37-42.
- [4] Natu M, Jape V, Prasad K. A study on burn cases. *The Ind J of Soc Work* 1974; 35 (3): 241-6.
- [5] Gupta M, Gupta OK, Yaduvanshi RK, Upadhyaya J. Burn epidemiology in the Pink city scene. *Burns* 1993; 22: 47-51.
- [6] Singh D, Singh A, Sharma AK, Sodhi L. Burn mortalities in the Chandigarh zone; 25 years of autopsy experience from a tertiary care hospital of India. *Burns* 1998; 24: 150-6.
- [7] Kumar V, Tripathi CB. Fatal accidental burns in married women. *Legal Medicine* 2003; 5: 139-145.
- [8] Zanjani NP, Godbole HV. A study of the fatal burn cases among medico-legal autopsies. *J Indian Acad Forensic Med*, 2007; 29 (3): 42-9.
- [9] Usama B. Ghaffar, Husain M, Rizvi J S. Thermal burns: An epidemiological prospective study. *J Indian Acad Forensic Med* 30(1): 10-4.
- [10] Datey S, Murthy NS, Taskar AD. A study on the burn injury cases from three hospitals. *Indian J Public Health* XXV (1981): 117.
- [11] Memchoubi P, Nabachandra H. A study on the burn deaths in Imphal, *J Indian Acad Forensic Med*, 2007; 29(4):131-4.
- [12] Kumar V, Mohanty MK, Kant S. Fatal burns in the Manipal area: A 10 year study. *Journal of Forensic and Legal Medicine*, 2007; 14(1): 3-6.
- [13] Mangal HM, Pathak A, Rathod JS. Fire is both "A blessing and a scourge to mankind". *J Indian Acad Forensic Med*, 2007; 29(4): 75-77.
- [14] Adamo C, Esposito G, Lissia M, Vonella M, et al .Epidemiological data on the burn injuries in Angola: a retrospective study of 7230 patients. *Burns* 1995; 21:536-8.
- [15] Srivastava AK, Arora P. Suspicious deaths among newly married females: A medicolegal analysis. *J Indian Acad Forensic Med*, 2007; 29(4); 63-66.
- [16] Chandler SE, Baldwin R. Furnishing in the home some fire statistics. *Fire Water* 1976; 1: 76-82.
- [17] Arora S, Antia NH. The treatment of burns in a district hospital. *Burns* 1977; 4: 49-51.
- [18] Sen R, Banerjee C. Survey of 1000 admissions to a burn unit at SSKM Hospital, Calcutta, *Burns* 1981; 7: 357-60.
- [19] Keswani MH. The prevention of burn injuries. *Burns*1986; 12(8): 533-39.
- [20] Agha RB, Benhamia A. Epidemiology of burns in Algiers. 1978-79; *Burns* 5: 204-05.
- [21] Iskrant AP, Joliet PV. *Accidents and homicides among the statistics of burns*. Cambridge. Harvard Univ Press 1965; 88.
- [22] Copeland AR. *Homicide by fire*. Z. Rechtsmed 1985; 95: 59-65.
- [23] Copeland AR. Suicidal fire deaths revisited. Z. Rechtsmed 1985; 51-57
- [24] Ragheb S, Qaryoute Sand H. Mortality of the burn injuries in Jordan. *Burns* 1984; 10: 439-43.
- [25] Saleh S, Gadalla S, Fortney JA, Rogers SM et al. Accidental burn deaths among Egyptian women of the reproductive age group. *Burns* 1986; 12: 241-45.

**AUTHOR(S):**

1. Dr. Richa Gupta
2. Dr. Vikas Kumar
3. Dr. S.K.Tripathi

**PARTICULARS OF CONTRIBUTORS:**

1. Department of Forensic Medicine,  
Institute of Medical Sciences,  
Banaras Hindu University, India - 221005.
2. Department of Microbiology,  
Institute of Medical Sciences,  
Banaras Hindu University, India - 221005.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. Richa Gupta  
Department of Forensic Medicine,  
Institute of Medical Sciences,  
Banaras Hindu University, India – 221005.  
E-mail: drrichag79@gmail.com

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