Original Research Article

Pattern and trends of deaths related to burns

Manigandaraj G[1*], Selvakumar R[2]

[1]Senior Assistant Professor, [2]Professor and HOD, Department of Forensic Medicine and Toxicology, Government Kilpauk Medical College and Hospital, Chennai – 10, INDIA.
Email: manigandaraj@yahoo.com

Abstract

Background: Fire has been known to mankind for about 400,000 years. Although the use of fire was known to ancient man, it is probably the potential fury of an unharnessed fire that made man bow before it. Burn injuries occur universally and have plagued mankind ever since antiquity till the present day. Fire can be a friendly, comforting thing, a source of heat and light, as anyone who has ever sat by a campfire in the dark of the night knows. Yet fire can also be dangerous and deadly, racing and leaping like a living thing to consume all in its path. Death due to burns was one of the commonest unnatural deaths found in society. **Material and Method:** The present study was conducted at Government Kilpauk Medical College and Hospital, Chennai 10, Tamil Nadu for a period of (1) Year from January 2020 to December 2020. **Results and Conclusion:** Out of 2719 Cases of death autopsied 515 Cases were burns which constitutes 18.94%of the overall deaths autopsied. Maximum cases of death due burns were seen in Females which contributed to 64.27% of the total deaths. Maximum deaths due to burns were seen in the age group of 21-30 years. Maximum death due to burns was seen in illiterate's (28.73%). Maximum deaths due to burns were seen in Labourer's (36.50%). Maximum cases of death due to burns were seen in low socio economic status (64.46%). Maximum cases of deaths due to burns occurred in kitchen (35.72%). The commonest source of fire in death due to burns was Cooking Gas Explosion (34.17%). Maximum cases of burns died within 24 hours of admission into our hospital(42.13%). Shock due to burns was the predominant cause of death (62.13%). The most common manner of death due to burns was found to be suicidal (57.66%).

Key Words: Fire, Burns, Shock, Septicaemia, Death.

[*]**Address for Correspondence:**
Dr Manigandaraj G, Senior Assistant Professor, Department of Forensic Medicine and Toxicology, Government Kilpauk Medical College and Hospital, Chennai – 10, INDIA.
Email: manigandaraj@yahoo.com

Received Date: 27/11/2020 Revised Date: 14/01/2021 Accepted Date: 22/02/2021
DOI: https://doi.org/10.26611/10181731A

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 12 March 2021

INTRODUCTION

The use of fire by man in various aspects has not only added to his comforts, but 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. Burn injuries occur universally and have plagued mankind ever since antiquity till the present day. Burn injuries are the commonest cause of unnatural death in India. Burns constitute a major cause of death and morbidity whatever reason may be, in the world and in this country too.[4] Burns always have posed a threat to the sensitive human body. Burns are one of the most challenging conditions encountered in medicine. The burn injury represents an assault on all aspects of the patient, from the physical to the psychological. It affects all ages, from children to elderly people, and is a problem in both the developed and developing world. All of us have experienced the severe pain that even a small burn can cause.[5] Burns are a global public health problem, accounting for an estimated 1,95,000 deaths annually. The majority of these occur in low- and middle-income countries and almost half of them occur in the WHO South-East Asia Region. In many high-income countries, death rates due to have been decreasing, and the rate of child deaths from burns is currently over seven times higher in low- and middle-income countries than in high-income countries. Non-fatal burns are a leading cause of morbidity, including prolonged hospitalization, disfigurement and disability, often with resulting stigma and rejection. Burns is among the leading cause of disability-adjusted life-years (DALYs) lost in low- and middle-income countries.[6] Among all discoveries made by men, only a few, such as cultivation of soil,

speech and writing, have borne such eventful developments as are finding out how to make fire. Manufacturing, transportation, practically all phases of modern industrial life, sprang from the discovery of fire and its tremendous force[18]. Whereas it took a man a long, long time to understand, appreciate, and reproduce these occurrences, it took him no time at all to realize that fire can hurt and hurt badly. Burns is injuries produced by application of dry heat, such as radiant heat, flame or any other heated solid substance like m *et al.* or glass to the surface of the body.[19] Burns is the 4thmost common type of trauma in the world, subsequent traffic accidents, falls, and interpersonal violence. 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[8]. A 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[9]. Our centre being the tertiary care centre for burns cases from all over Tamil Nadu and neighbouring states like Andhra Pradesh and Karnataka are referred for higher treatment. 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.

AIMS AND OBJECTIVES

To study the demographic and the injury profiles of the burns fatalities which were brought to the mortuary of the Department of Forensic Medicine and Toxicology

INCLUSION CRITERIA

All cases of burns, brought for Medico Legal Post – Mortem Examination to the Mortuary of Government Kilpuak Medical College and Hospital, Chennai – 10.

EXCLUSION CRITERIA

Cases with history of sustaining other thermal injuries like scald burns, electrocution, lightning, post – mortem burns, charred and partly skeletonised dead bodies were excluded out from the study.

OBSERVATIONS

Table 1: Sex wise distribution of death due to burns

SEX	FREQUENCY	PERCENTAGE %
MALE	184	35.72
FEMALE	**331**	**64.27**
TOTAL	**515**	**100**

Maximum cases of death due burns were seen in Females which contributed to 64.27% of the total deaths.

Table 2: Age wise distribution of death due to burns

AGE IN YEARS	FREQUENCY	PERCENTAGE %
BIRTH TO 10	42	8.15
11 – 20	33	6.40
21 – 30	**189**	**36.69**
31 – 40	82	15.9
41 – 50	62	12.03
51 – 60	44	8.54
61 – 70	22	4.27
71 – 80	37	7.18
81 – 90	04	0.77
TOTAL	515	100

Maximum deaths due to burns were seen in the age group of 21-30 years which constitutes (36.69%) of deaths followed by 31-40 Years (15.9%) and 41-50 Years (12.03%).

Table 3: Educational status wise distribution of burns

EDUCATION OF THE VICTIM	FREQUENCY	PERCENTAGE %
ILLETRATE	**148**	**28.73**
JUNIOR SCHOOL	88	17.08
MIDDLE SCHOOL	46	8.93
HIGH SCHOOL	54	10.48
GRADUATE	101	19.61
POST GRADUATE	78	15.14
TOTAL	**515**	**100**

Maximum death due to burns were seen in illiterate's (28.73%) followed by Graduates (19.61%) and junior school education (17.08%).

Table 4: Occupation wise distribution of burns

OCCUPATION	FREQUENCY	PERCENTAGE %
LABOURER	**188**	**36.50**
STUDENT	29	5.63
HOUSE WIFE	175	33.98
BUSINESS	33	6.40
FARMER	48	9.32
UN EMPLOYED	42	8.15
TOTAL	515	100

Maximum deaths due to burns were seen in Labourer's (36.50%) followed by house wife (33.98%) and farmer's (9.32%).

Table 5: Distribution of deaths due to burns based on socio economic status

SOCIO ECONOMIC STATUS	FREQUENCY	PERCENTAGE %
LOW SOCIO ECONOMIC STATUS	**332**	**64.46**
MIDDLE SOCIO ECONOMIC STATUS	141	27.37
HIGH SOCIO ECONOMIC STATUS	42	8.15
TOTAL	515	100

Maximum cases of death due to burns were seen in low socio economic status (64.46%) followed by middle socio economic status (27.37%).

Table 6: Distribution of death due to burns based on site of incidence

SITE OF INCIDENCE	FREQUENCY	PERCENTAGE %
KITCHEN	**184**	**35.72**
LIVING ROOM	83	16.11
COURTYARD	56	10.87
WORKPLACE	60	11.65
OUTDOORS	132	25.63
TOTAL	515	100

Maximum cases of deaths due to burns occurred in kitchen (35.72%) followed by at outdoors (25.63%) and in the living room (16.11%).

Table 7: Distribution of death due to burns based on source of fire

SOURCE OF FIRE	FREQUENCY	PERCENTAGE %
COOKING GAS EXPLOSION	**176**	**34.17**
PUMP STOVE EXPLOSION	105	20.38
KEROSENE	94	18.25
PETROL / DIESEL	103	20
MATCH STICK	26	5.04
WOOD FIRE	11	2.13
TOTAL	515	100

The commonest source of fire in death due to burns was Cooking Gas Explosion (34.17%) followed by pump stove explosion (20.38%) and inflammable materials like petrol and diesel (20%).

Table 8: Distribution of burns based on period of survival

PERIOD OF SURVIVAL	FREQUENCY	PERCENTAGE %
BROUGHT DEAD	103	20
UPTO 24 HOURS	**217**	**42.13**
24 HOURS – 48 HOURS	87	16.89
48 HOURS – 72 HOURS	72	13.98
>72 HOURS	36	6.99
TOTAL	515	100

Maximum cases of burns died within 24 hours of admission into our hospital(42.13%) followed by brought dead cases (20%) and survival between 24 hours to 48 hours (16.89%).

Table 9: Cause of death

CAUSE OF DEATH	FREQUENCY	PERCENTAGE %
SHOCK DUE TO BURNS	**320**	**62.13**
SEPTICAEMIC SHOCK	123	23.88
TOXAEMIA	72	13.98
TOTAL	**515**	**100**

Shock due to burns was the predominant cause of death (62.13%) followed by septicaemic shock (23.88%).

TABLE 10: MANNER OF DEATH

MANNER OF DEATH	FREQUENCY	PERCENTAGE %
SUICIDAL	**297**	**57.66**
ACCIDENTAL	185	35.92
HOMICIDAL	33	6.40
TOTAL	**515**	**100**

The most common manner of death due to burns was found to be suicidal (57.66%) followed by accidental (35.92%) and homicidal cases contributed to (6.40%) of the total deaths.

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 pro-duce severe economic and social consequences on the victim's families and also on the society in general. An analysis has been made based on the sociodemographic profile with the following results. Maximum cases of death due burns were seen in Females which contributed to 64.27% of the total deaths. This is similar to the study conducted by Ambade VN, Godbole HV. Mangal H.M., Pathak A, Rathod J.S and Zanjad NP, Godbole HV[14,20] where maximum cases of burns related death were confined to females. 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 would have favoured aggravation of the burn injuries. Maximum deaths due to burns were seen in the age group of 21-30 years which constitutes (36.69%) of deaths followed by 31-40 Years (15.9%) and 41-50 Years (12.03%).This study is almost similar to the study conducted by Gupta R, Kumar V, Tripathi SK.Prakash.IBabladi, Vijayanath.V, Vijayamahantesh.S.N and Dr.GirishV.Tasgaonkar, Dr.K.U.Zine, Dr.Vikas.P *et al.*l[7,11]. It could be explained by the facts that the persons of this young age group are suffering from stress of the modern life style, family problems, financial problems. Maximum death due to burns were seen in illiterate's (28.73%) followed by Graduates (19.61%) and junior school education (17.08%).This is almost similar to the studies conducted by Richa Gupta, Vikas Kumar, S.K.Tripathi.Dr.GirishV.Tasgaonkar, Dr.K.U.Zine, Dr.Vikas.P*et al.*l and Dasari H, Kumar A, Sharma BR[7,8].In developing countries like India, the preponderance of the illiteracy and poverty, which together give rise to greater issue to deaths due to burns.Maximum deaths due to burns were seen in Labourer's (36.50%)followed by house wife (33.98%) and farmer's (9.32%). This is almost similar to the studies conducted by Natu M, Jape V, Prasad K and Richa Gupta, Vikas Kumar, S.K.Tripathi[3,8]. This could be attributed to their financial crisis, stress involved and low pay. Maximum cases of death due to burns were seen in low socio economic status (64.46%) followed by middle socio economic status (27.37%).This is almost similar to the studies conducted byKumar V, Mohanty MK, Kanth S.Shinde AB, Keoliya AN and Gupta R, Kumar V, Tripathi SK[6,11,15]. This may be due to poverty, financial crisis, stress related to work and competition in education.Maximum cases of deaths due to burns occurred in kitchen (35.72%) followed by at outdoors (25.63%) and in the living room (16.11%).This is similar to the study conducted byRicha Gupta, Vikas Kumar, S.K.Tripathi[8] and Copeland AR[29]. In contrast, a study from Cambridge reported 57% of the burns to occur at work places, which were employment related 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. The commonest source of fire in death due to burns was Cooking Gas Explosion (34.17%) followed by pump stove explosion (20.38%) and inflammable materials like petrol and diesel (20%). This is almost similar to the study conducted by Richa Gupta, Vikas Kumar, S.K.Tripathi[8]

were materials is easily available inside the house which were used for commiting suicides, homicides and also pertained to accidental burns while cooking. Maximum cases of burns died within 24 hours of admission into our hospital(42.13%) followed by brought dead cases (20%) and survival between 24 hours to 48 hours (16.89%). This is in contrast to the study conducted byDr.GirishV.Tasgaonkar, Dr.K.U.Zine, Dr.Vikas.P *et al.*l[7] where most of the patients died > 72 hours of hospital admission. This shows that in our study the intensity of the burns is high more or less it was referred from other hospitals for further treatment since our centre is the tertiary health care super speciality centre for burns. Shock due to burns was the predominant cause of death (62.13%) followed by septicaemic shock (23.88%).This is in contrast to the study conducted byDr.GirishV.Tasgaonkar, Dr.K.U.Zine, Dr.Vikas.P *et al.*[7] where septicaemic shock was high. This clearly shows about the quality of our hospital where the infection rate is low and also could depend upon the intensity of burns. Most of the cases where having burns with larger surface areas involved which died earlier within 24 hours of hospital admission due to shock burns. The most common manner of death due to burns was found to be suicidal (57.66%) followed by accidental (35.92%) and homicidal cases contributed to (6.40%) of the total deaths. This is in contrast to the studies conducted by Dr.GirishV.Tasgaonkar, Dr.K.U.Zine, Dr.Vikas.P *et al.*[7] and Richa Gupta, Vikas Kumar, S.K.Tripathi[7] were maximum cases were accidental. Kitchen being the easiest access for the womens and because of the deep –rooted custom of dowry and marital disharmony which could have compelled the married females either to commit suicide or they may be killed by their in laws and husbands.

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.

RECOMMENDATIONS

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.

REFERENCES

1. Kumar V, Tripathi CB. Fatal accidental burns in married women. Legal Medicine 2003;5:139-145.
2. UsamaB.Ghaffar, Husain M, Rizvi JS. Thermal burns: An epidemiological prospective study. J Indian Acad Forensic Med, 2007; 29 (3): 42-9.
3. Natu M, Jape V, Prasad K. A study on burns cases. The Indian J OF soc Work 1974; 35(3):241-6
4. Chawla R, Chanana A, Rai H, Aggarwal AD, Singh H, Sharma G. A Two-year Burns Fatality Study. J Indian Acad Forensic Med 2005;32(4):292-7.
5. Prakash.IBabladi, Vijayanath.V, Vijayamahantesh.S.N, Burns and burning issues in Gulbarga, Karnataka; Indian Journal of Forensic Medicine Toxicology;July-Dec 2010;Vol 4,No.2:85-87.
6. Shinde AB, Keoliya AN. Socio-demographic characteristics of burn deaths in rural India. International J. of Health care and Biomedical Research 2013 April;1(3):227-33.
7. Dr.GirishV.Tasgaonkar, Dr.K.U.Zine, Dr.Vikas.P*et al.*l Study of trends of burn deaths at Aurangabad region in india. Scholar Journal Of Applied Medical Sciences (SJAMS) 2015; 3 5(C): 2013-2018.
8. Richa Gupta, Vikas Kumar, S.K.Tripathi. Profile of the fatal burn deaths from the Varanasi region India. Journal of Clinical and Diagnostic Research. 2012 May (Suppl-2), Volume: 6(4): 608-611.
9. Buchade D, Kukde H, Dere R, Savardekar R. Pattern of burns cases brought to morgue, Sion Hospital, Mumbai: A Two year study. JIAFM 2011 Oct-Dec;33(4):309-10.
10. Singh D, Jash PK, Tyagi S. Recent trends in burn mortality in Northwest India and its preventive aspects. JIAFM 1997 Oct-Dec;19(4):79-88.
11. Gupta R, Kumar V, Tripathi SK. Profile of the fatal burn deaths from the Varanasi region, India. Journal of Clinical and Diagnostic Research 2012 May; 6(4):608-11.
12. Zanjad NP, Godbole HV. Study of fatal burn cases in medico-legal autopsies. JIAFM 2007;29(3):42-9.
13. Memchoubi PH, Nabachandra H. A study of burn deaths in Imphal. JIAFM 2007; 29(4):131-4.
14. Ambade VN, Godbole HV. Study of burn deaths in Nagpur, central India. Burns 2006;32:902-8.
15. Kumar V, Mohanty MK, Kanth S. Fatal burns in Manipal area: A 10 year study. Journal of Forensic and Legal Medicine 2007;14:3-6.
16. Koulapur VV, Yoganarsimha K, Gouda H, Mugadlimath AB, Vijaykumar AG. Analysis of fatal burns cases-A 5 year study at Sri B M Patil Medical College, Bijapur, Karnataka. Medico-legal update 2011Jul-Dec;11(2):107-9
17. Afify MM, Mahmoud NF, Ghada M, Azzim AE, Nevein A, Desouky EI. Fatal burn injuries: A five year retrospective autopsy study in Cairo city, Egypt. Egptian Journal of Forensic Sciences 2012;2:117-22.

18. Tedeschi CG, Eckert WG, Tedeschi LG; Forensic Medicine a study in trauma and environmental hazards. 1st Edition, Philadelphia: W.B. Saunders; 1977; 715-729.
19. Modi's edited by Mathiharan K and Patnaik AK; Medical Jurisprudence and Toxicology. 23rd Edition. New Delhi. LexisNexis: 2007; 629-641.
20. Mangal H.M., Pathak A, Rathod J.S: The fire is both a blessing and cougar to the mankind JIAFM, 2007; 29(4): 75-77.
21. Dasari H, Kumar A, Sharma BR; Burns Septicaemia – The leading cause of burn mortality. Editorial JPAFMAT, 2008; Volume 2.
22. Srivastava AK. Arora P. Suspicious deaths among newly married females: A medicolegal analysis. J Indian Acad Forensic Med, 2007; 29(4); 63-66.
23. Chandler SE, Baldwin R. Furnishing in the home some fire statistics. Fire Water 1976; 1: 76-82.
24. Arora S, Antia NH. The treatment of burns in a district hospital. Burns 1977; 4: 49-51.
25. Sen R, Banerjee C. Survey of 1000 admissions to a burn unit at SSKM Hospital, Calcutta, Burns 1981; 7: 357–60.
26. Keswani MH. The prevention of burn injuries. Burns1986; 12(8): 533-39.
27. Agha RB, Benhamia A. Epidemiology of burns in Algiers. 1978-79; Burns 5: 204-05.
28. Iskrant AP, Joliet PV. Accidents and homicides among the statistics ofburns. Cambridge. Harvard Univ Press 1965; 88.
29. Copeland AR. Homicide by fire. Z.Rechtsmed 1985; 95:59-65.
30. Copeland AR. Suicidal fire deaths revisited. Z.Rechtsmed 1985; 51-57.

Source of Support: None Declared
Conflict of Interest: None Declared