Indian Internet Journal of Forensic Medicine & Toxicology
Vol. 19, No. 2, April-June 2021, 32-36
DOI : 10.5958/0974-4487.2021.00008.0

Original Article

Epidemiology and Outcome of Death Due to Burn Injuries –A Prospective Study

Surendra Singh[1], Archana Kaul[2]* and Rajesh Kumar Rai[3]

[1]Resident, [2]Professor and Head, [3]Associate Professor, Moti Lal Nehru Medical College, Allahabad, Uttar Pradesh, India
*Corresponding author email id: drarchanakaulmln@gmail.com

Received: 10-01-2021; Accepted: 11-04-2021

ABSTRACT

A burn is an injury which is caused by application of heat or chemical substances to the external or internal surfaces of the body, which causes destruction of tissues. Thermal deaths are those which result from the effects of systemic and/or localized exposure to excessive heat and cold [1]. The present study has been carried out on 150(39 males and 111 females) cases of death due to burn, brought to the mortuary of Swaroop Rani Nehru Hospital, Moti Lal Nehru Medical College, Prayagraj for medico legal autopsy during the study period of one year extending from 01 July 2019 to 30 June 2020. Female outnumbered males i.e. 111(74.00%) females and 39(26.00%) males. Maximum number of burn deaths i.e., 56(37.33%) cases occurred in the young age group 21-30. Accidental burn injuries can be reduced by bringing about regulations to develop safer cooking appliances, promoting less inflammable fabrics to be worn at home and educating the community especially women.

Keywords: Burn, Mortuary, Thermal, Autopsy, Inflammable

INTRODUCTION

Globally, burns are a serious public health problem. According to the World Health Organization, an estimated 265000 deaths occur each year from fires alone. Burn constitutes a major role in mortality and morbidity in the whole world, whether accidental, suicidal or homicidal. The majority of these occur in low and middle-income countries and almost two thirds occur in the African and South-East Asia regions. According to statistics, burns are the fourth most common type of injury in the world, ranking behind traffic accidents, falls and intentional injuries. In India, around seven million people suffer from burn injuries each year, with 1.4 lakh death and 2.4 lakh people suffering with disability. The high incidence is attributed to illiteracy, poverty and low level safety consciousness in the population. In medical science, most diseases can be cured by medicine or by surgery. Burn injuries due to fire are also treated but unfortunately the results of treatment are not satisfactory. The situation becomes further grim due to the absence of organized burn care at primary and secondary health care level.

MATERIAL AND METHODS

The present study has been carried out on 150(39 males and 111 females) cases of burn, brought to the mortuary of Swaroop Rani Nehru Hospital, Moti Lal Nehru Medical College, Prayagraj for medico legal autopsy during the study period of one year extending from 01 July 2019 to 30 June 2020. This is a prospective cross

sectional descriptive study. All the cases are examined and various parameters are noted and cause of death established by the autopsy. Our study attempted to define the circumstances, motives, extent, severity, examination of external and internal pathological features of burn injuries in their victims. For the purpose of study relevant questionnaire was prepared to collect various data related to their epidemiological characteristics e.g. age, sex, nature, distribution, types of injuries etc. including their medico legal aspects.

RESULT AND DISCUSSION

In the present study (Figure 1) it is observed that the majority of victims of burn death 106(70.66%) were married. Married females are more commonly involved than married males. Similarly, [3] observed that 73(70.87%) cases of burn victim were married, Ghaffer [7] observed that 72.5% cases of burn victim were married which is similar to this study. Reason behind this could be due to increasing familial stress, dowry demands, day to day problem like jobs, family disputes, cooking activities etc. and hurrying through in an overcrowded room with minimal amenities inviting frequent accidents commonly among married people and mostly in female. However, our result is not consistent with the results [4,8] where maximum numbers of burn victims were unmarried.

In present study (Figure 2) it is observed that majority of cases belongs to rural area 119(79.33%). Similarly, [4,6,9, 11,10,12] revealed that burns incident is more common in

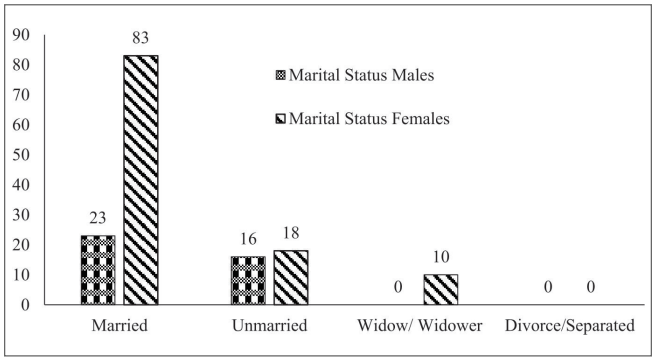

Figure 1: Distribution of burn death cases according to marital status

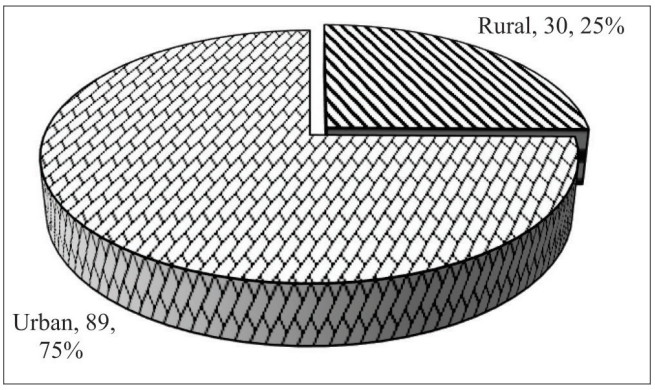

Figure 2: Distribution of burn death cases according to their area of residence

the rural area which is similar to this study. This could be due to the traditional household practice of cooking in rural area, large scale use of unsafe stoves and use of kerosene as a fuel for cooking and lightening lamp, lack of safety system and the prevailing socio-cultural determinant.

In present study Table 1 it can be observed that maximum number of burn deaths i.e., 56(37.33%) occurred in the young age group 21-30 yrs. Similarly, [26] observed that maximum number of deaths 43(53.75%), [9,10,11,13,14,15,16,24], revealed that burns incident is more common in the age group of 21-30 years which is similar to this study. Reason behind this could be that this age

Table 1: Distribution of burn death cases among different age groups (N=150)

Age Groups (Years)	No. of cases		Total
	Males	Females	
01-10	2 (1.33%)	0(0.00%)	2 (1.33%)
11-20	7(4.66%)	21(14.00%)	28 (18.66%)
21-30	13(8.66%)	43(28.66%)	56 (37.33%)
31-40	5(%3.33)	20(13.33%)	25 (16.66%)
41-50	4(2.66%)	9(6.00%)	13 (8.66%)
51-60	7(4.66%)	9(6.00%)	16 (10.67%)
61-70	1(0.66%)	6(4.00%)	7 (4.66%)
71-80	0(0%)	3(2.00%)	3 (2.00%)
Total	39 (26.00%)	111 (74.00%)	150 (100%)

group is a productive age, more active, and they are generally exposed to hazardous situations both at home and work. Female in this age group more succumbed to burn injury as the contact with fire is more common in female due to cooking related activity. And male are exposed to burn due to his work related activity like industrial works (e.g. exposure to hot steam, boiling liquid, electric work etc.).

In present study Table 2 it is observed that majority of the cases belongs to illiterate 40(26.66%). Similarly, [18] observed that majority of the cases are illiterate 53.28%, [19] observed that majority of the cases are illiterate 59%, [17] in her analysis showed that the major portions of the burnt cases were illiterate which is similar to this study. Reason behind this could be because illiterate people are becoming vulnerable, because of their ignorance and emotional component. Off course, low socio economic status also added that. However, [26] observed that maximum cases belong to high school education 32.5% followed by primary school education 31.25% which is not similar to this study.

In present study Table 3 it is observed that majority of the burn victims belong to housewife 85(56.66%). Similarly, [26] observed that 92.5% of the victims were house wives, [11,13,20,21] revealed that burns incident is more common in housewives which is similar to this study.

Table 3: Distribution of burn death cases according to occupational status (N=150)

Occupation	No. of cases		Total
	Male	Female	
Profession	0(0.00%)	0(0.00%)	0(0.00%)
Semi-profession	0(0.00%)	0(0.00%)	0(0.00%)
Clerical, shop-owner, farmer	5(3.33%)	3(2.00%)	8(5.33%)
Service and sales workers	4(2.66%)	0(0.00%)	4 (2.66%)
Skilled worker	2(1.33%)	0(0.00%)	2(1.33%)
Semi-skilled worker	3(2.00%)	0(0.00%)	3(2.00%)
Unskilled worker	5(3.33%)	9(6.00%)	14(9.33%)
Unemployed	15(10.00%)	0(0.00%)	15(10.00%)
Housewife	0(0.00%)	85(56.66%)	85(56.66%)
Student	5(3.33%)	14(9.33%)	19(12.66%)
Total	39(%)	111(%)	150(100%)

In present study Table 4 it is observed that all the incidences were due to flame burn, kerosene oil were seen in majority of cases 96(64.00%). Similarly, [9,11,14,20,22,23,25] revealed that burns incidences are more common due to flames which is similar to this study. The high incidence of flame burn is explained by use of oil for lamps in villages, candle for lighting, substandard kerosene and gas stoves, use of open coal and wood fires chullha for warmth and cooking in villages and use

Table 2: Distribution of burn death cases according to educational status (N=150)

Education	No. of cases		Total
	Male	Female	
Professional or Honors	0(0.00%)	0(0.00%)	0(0.00%)
Graduate or Postgraduate	6(4.00%)	5(3.33%)	11(07.33%)
Intermediate or post high school diploma	8(5.33%)	14(9.33%)	20(14.67%)
High school certificate	9(6.00%)	26(17.33%)	35(23.33%)
Middle school certificate	4(2.66%)	18(12.00%)	22(14.66%)
Primary school certificate	3(2.00%)	17(11.33%)	24(13.33%)
Illiterate	9(6.00%)	31(20.66%)	40(26.66%)
Total	39(26.00%)	111(74.00%)	150(100%)

Table 4: Distribution of burn death cases according to inflammable substance used in burn (N=150)

Type	Source of burn	No. of cases		Total
		Male	Female	
Flame	Kerosene oil	31(20.66%)	65(43.33%)	96(64.00%)
	L.P.G.	0(0.00%)	14(9.33%)	14(9.33%)
	Petrol/Diesel	2(1.33%)	0(0.00%)	2(1.33%)
	Direct contact of flame	6(4.00%)	32(21.33%)	38(25.33%)
Scald		0(0.00%)	0(0.00%)	0(0.00%)
Others		0(0.00%)	0(0.00%)	0(0.00%)
Total		39(26%)	111(74%)	150(100%)

Table 5: Distribution of burn death cases according to extent of body surface area involved (N=150)

Extent of Body Surface Area Involved	No. of cases		Total
	Male	Female	
0-25%	1(0.67%)	0(0.00%)	1 (0.67%)
26-50%	6(4.00%)	14(9.33%)	20 (13.33%)
51-75%	13(8.66%)	35(23.33%)	48 (32.00%)
76-100%	19(12.66%)	62(41.33%)	81 (54.00%)
Total	39(26%)	111(74%)	150(100%)

of pressure stoves for cooking in urban areas. Female are most commonly involved in flame burn injury than males as they are more involved in cooking activities and have direct contact with fire with most of the times.

In present study Table 5 it is observed that extent of body surface area involved was maximum 81(54.00%) cases in the category 76-100%. Similarly, [9,24] revealed that total body surface involved was greater than 80% category, in the study [2] patients with TBSA of more than 75% had a greater mortality rate which is similar to this study. Burns on the head and neck, trunk and upper extremity increase the mortality risk. However, Mangal [14] found that the total body surface area involved was more in 40-60% category which is not similar to this study. Naturally, patients with higher TBSA involved may die in the early period due to burn shock, whereas causes of mortality at the long term are sepsis and multiple organ failure.

CONCLUSION

Young and newly married females with household responsibilities are prone to sustain burn injuries. Safety measures should be followed while cooking. Bride burning is a social evil unmatched in its cruelty and cynicism in today's civilized society. In most of the cases of death due to burn injury, accident is the alleged manner of death. Kerosene is commonly available for household cooking and hence used by suicides as an accelerant. Smell of kerosene perceived on autopsy should be carefully noted. Shock and septicemia are the causes of death following burn injuries. Proper rehydration and prevention of hospital acquired infection is the key to prevent deaths in burn cases. Burn prevention is not easy, we have no options; burns must be prevented.

ETHICAL CLEARANCE

Ethical clearance for this study is taken from Ethical committee of Moti Lal Nehru Medical College, Allahabad.

REFERENCES

[1] Reddy KSN. Essentials of Forensic Medicine & Toxicology. 26th ed. Hyderabad: K. Sugunadevi. 2007;278-293.

[2] Dastgiri S *et al*. Incidence, survival pattern and prognosis of self-immolation: a case study in Iran. Journal of Public Health. 2006;14(1):2–6.

[3] Tirpude BH, Khandekar IL, Wankhade TD, Murkey PN, Salankar A. Profile of Burn Injury Cases and Medicolegal Formalities Done at Clinical Forensic Medicine Unit (CFMU)

of MGIMS, Sewagram. Indian Journal of Forensic Medicine and Pathology. 2016;9(1):5.

[4] Tripathi CB *et al*. Burnt wives: A sociological study. International Journal of Medical Toxicology & Legal Medicine. 1999;2(1):25-45.

[5] Kumar V, Tripathi CB, Kanth S. Burnt wives: A study of autopsy findings. Journal of Indian Academy of Forensic Medicine. 2000;22(2):33-39.

[6] Vaghela PC, Ahir GN, Patel MH. Epidemiology of fatal burn cases in GK General Hospital, Bhuj. National Journal of Community Medicine. 2012;3(2):326-329.

[7] Ghaffar UB, Husain M, Rizvi SJ. Thermal burn: an epidemiological prospective study. Journal of Indian Academy of Forensic Medicine. 2008;30(1):10-14.

[8] Rao NG. Study of fatal female burns in Manipal. Journal of Forensic Medicine and Toxicology. 1997;14(2):57-60.

[9] Zanjad NP, Godbole HV. Study of Fatal Burn Cases in Medico-legal Autopsies JIAFM, 2007;29(3):25-35.

[10] Shankar S, Priyatharsini K. A Comprehensive Study of Death due to Burns in Married Women-An Autopsy based Study Conducted in Tertiary Care Hospital. Indian Journal of Forensic Medicine & Toxicology. 2019;13(4):25-35.

[11] Harish D, Kaur C, Singh A, Kumar A. A comprehensive analysis of deaths due to burns in a tertiary care centre. 2013;13(2):25-35.

[12] Jaiswal KA, Aggarwal H, Solanki P, Lubana PS, Mathur RK, Odiya S. Epidemiological and socio-cultural study of burn patients in MY Hospital, Indore, India. Indian Journal of Plastic Surgery. 2007;40(2):158-163.

[13] Singh D, Jash PK, Tyagi S. Recent trends in burn mortality in northwest India and its preventive aspects. Journal of Indian Academy of Forensic Medicine. 1997;19:79-88.

[14] Mangal HM, Pathak A, Rathod JS. The Fire is both. A blessing & Scourge to the mankind. Journal of Indian Academy of Forensic Medicine. 2007;29(4):75-77.

[15] Shinde AB, Keoliya AN. Socio-demographic characteristics of burn deaths in rural India. International Journal of Health care & Biomedical Research. 2013;1(3):227-233.

[16] Pandey SK and Chaurasia N. Thermal burn: An epidemiological Retrospective study. Journal of Punjab Academic Forensic Medicine Toxicology. 2014;14(1):10-35.

[17] Sakhre S. Analytical study of 1200 suspicious deaths of newly married women in Vidharbha region of Maharashtra state in India. In: a seminar on women and violence held on 11th July. InProceedings of the Womens' Decade World Conference, July 10-19, Nairobi, Kenya, 1985.

[18] Kumar V *et al*. Burnt wives: A Sociological study. International Journal of Medical Toxicology and Legal Medicine. 1999;2(2):27-34.

[19] SM DG, Tripathi CB. Burnt wife syndrome. Annals of the Academy of Medicine, Singapore. 1984;13(1):37-42.

[20] Gupta RK, Srivastava AK. Study of fatal burns cases in Kanpur (India). Forensic Science International. 1988;37(2):81-89.

[21] Ande JD, Kumar SV, Satyadev M, Tirumala N, Guguloth K, Chandana N. Pattern of Thermal Burn Injuries and their outcomes at Burn Care Unit of Tertiary Hospital, Warangal, Andhra Pradesh, India. International Journal of Pharmaceutical Sciences Letters. 2013;3(6):288-295.

[22] Afify MM, Mahmoud NF, Abd El Azzim GM, El Desouky NA. Fatal burn injuries: A five year retrospective autopsy study in Cairo city, Egypt. Egyptian Journal of Forensic Sciences. 2012;2(4):117-122.

[23] Lal S, Yadav GK, Gupta R, Shrivastava GP, Singh S, Bain J. Mortality pattern of burn patients admitted in SGM Hospital Rewa: A teaching institute of central India. Journal of the Scientific Society. 2012;39(3):130.

[24] Mohanty MK, Arun M, Monteiro FN, Palimar V. Self-inflicted burns fatalities in Manipal, India. Medicine, Science and the Law. 2005;45(1):27-30.

[25] Paudel PD. Pattern of burn patients admitted in a burn unit of Bir hospital Kathmandu. Post-Graduate Medical Journal of NAMS. 2010;10(2):29-34.

[26] Shankar S, Priyatharsini K. A Comprehensive Study of Death due to Burns in Married Women-An Autopsy based Study Conducted in Tertiary Care Hospital. Indian Journal of Forensic Medicine & Toxicology. 2019;13(4): 23-33.

How to cite this article: Singh S, Kaul A and Rai RK. Epidemiology and Outcome of Death Due to Burn Injuries –A Prospective Study. Indian Internet Journal of Forensic Medicine & Toxicology 2021; 19(2): 32-36.