

ORIGINAL PAPER

Epidemiology of Fatal Burn injuries in a Teaching Hospital in West Bengal

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Received on Feb 28, 2017; editorial approval on May 26, 2017

ABSTRACT

Introduction: Burn is a public health problem, causing an estimated 2, 65,000 deaths annually all over the world. **Aims:** The present study was conducted to study the epidemiology of fatal burn cases in a hospital based sample. **Methods:** Retrospective and cross-sectional prospective studies were used to determine all the fatal burn cases reported at the Burdwan Medical College Police Morgue. **Results:** From 2007-2009, the percentage of deaths due to fatal burn injuries was reported to be 10.78%, 12.81% and 11.91% respectively. The mean percentage of males and females is 18.84% and 81.15% respectively. Most of the victims were of the age group of 20-40 years. Rural dwellers were affected more, with the toll rising in winter months. Accidental deaths were rather common (53.61%). 24.74% was due to burn related dowry deaths. Maximum incidents of burn happened between 6.00 p.m. and 12.00 midnights. Maximum rate of mortality is within first 12 hours of sustaining injuries, with the percentage of burn being inversely proportional to the time of survival. **Conclusion:** Legislation, health promotion and appliance design have reduced the incidence of burns, with regulations regarding flame-retardant clothes and furniture, the promotion of smoke alarms, the design of cookers and gas fires, the almost universal use of cordless kettles, the education of parents and proper functioning of burn units of hospitals at all levels.

Keywords: Burdwan, dowry, winter, rural

INTRODUCTION

Injuries are an increasing recognized public health problem, affecting nearly every geographical zone of the earth.¹ Burns have always been considered as one of the most destructive injuries, causing not only mortalities, but also having major economic, psychological and somatic effects.^{2,3} Burns are also among the most expensive traumatic injuries, causing long hospitalization and rehabilitation, and costly wound and scar

treatment.^{4,5} Thus burn is a public health problem, causing an estimated 2,65,000 deaths annually all over the world.⁶

In this backdrop, the present study has been designed to analyze the epidemiology of fatal burn cases. Worldwide, approximately 6 million patients seek medical help for burns annually and the majority are treated in the outpatient department.⁷ The need for inpatient treatment solely depends upon the severity of burn, the associated injuries and the general condition of the patient.^{8,9} Despite many medical advances, burns continue to remain a challenging problem due to the lack of infrastructure and trained professionals as well as the increased cost of treatment, all of which have an impact on the outcome.¹⁰ Thus this study will explore the problems against the backdrop of our health care setup and will probably help to formulate the strategies for the prevention of unnatural deaths due to burns.

MATERIALS AND METHODS

All the fatal burn cases reported for autopsy at Police Mortuary, Burdwan Medical College, were examined from February 2010 to January 2011 and cross-sectional prospective study was carried out. Retrospective study of the fatal burn cases from 2007-2009 was also carried out. Socio-demographic profile of the victims of burn (From the history taken from the police officials and the relatives accompanying the victim), seasonal variations, manners of injuries, time of incident, percentage of burn (using Rule of Nine) and the interval between sustaining burn and death (from the inquest and the information of death) were considered as the

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parameters in the present study. Subjects with only burn injuries in fresh bodies were considered for the study and not the subjects who died due to scalds, electrocution, and lightning or radiation injuries or were found to be decomposed at the time of autopsy. Ethical clearance was taken from the institutional ethic committee. All the data were analyzed using “SPSS for Windows”.

RESULTS

Fatality due to burns: The total number of cases examined in the years 2007, 2008 and 2009 were 1938, 2021 and 2007 respectively. Among all these cases, the total number of victims due to fatal burn injuries in the years 2007, 2008 and 2009 were 209 (10.78%), 259 (12.81%) and 239 (11.91%) respectively.

Gender distribution in the years 2007- 2009 and the present study period

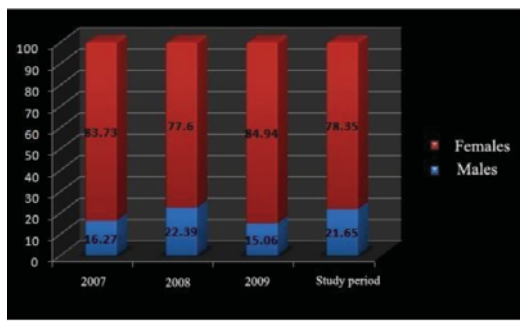


Figure 1 Gender distribution

Age distribution in the present study period

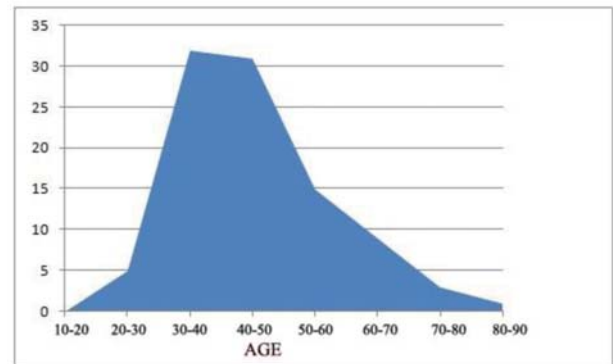


Figure 2 Age distribution

Distribution by religion in the years 2007- 2009 and the present study period: The total percentage of Hindus in the years 2007,2008,2009 and the present study were 80.86, 84.94, 82.84 and 80.41 respectively, whereas the total percentage of Muslims were 19.14, 15.06, 17.16 and 19.59 respectively.

Residential status (urban / rural) in the years 2007- 2009 and the present study: The total percentage of cases from rural areas in the years 2007, 2008, 2009 and the present study were 82.78, 83.39, 80.33 and 82.47 respectively, and that from the urban areas were 17.22, 16.61, 19.66 and 17.53 respectively.

Seasonal variation in the years 2007-2009 and the present study period

Table 1 Seasonal variation

Period	2007		2008		2009		Present Study	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
JAN	29	13.86	21	8.11	19	7.95	-	-
FEB	16	7.66	20	7.72	15	6.28	-	-
MAR	20	9.57	28	10.81	19	7.95	-	-
APR	15	7.18	31	11.97	17	7.11	13	13.402
MAY	21	10.05	12	4.63	26	10.88	9	9.28
JUN	20	9.57	31	11.97	22	9.205	9	9.28
JUL	13	6.22	16	6.18	23	9.62	14	14.43
AUG	5	2.39	17	6.56	15	6.28	11	11.34
SEP	12	5.74	22	8.49	17	7.11	8	8.25
OCT	12	5.74	17	6.56	20	8.37	9	9.28
NOV	23	11.004	18	6.95	17	7.11	12	12.37
DEC	23	11.004	25	9.65	29	12.13	12	12.37

The trends observed in dowry deaths in the present study period

Table 2 Dowry death trends

DOWRY DEATH TRENDS						
Total Deaths	Percentage	Mean Age	Religion		Place	
			Hindu	Muslim	Rural	Urban
24	24.74%	24.79	87.5%	12.5%	83.33%	16.67%

A: Accident, S: Suicide, H: Homicide

The time of incidence in the present study period

Table 3 Times of incidence

Groups	Time Periods	Percentage
A	12.01 a.m.-6.00 a.m.	13.40%
B	06.01 a.m.-12.00 noon	25.77%
C	12.01 p.m.-6.00 p.m.	28.87%
D	6.01 p.m.-12.00 midnight	31.96%

Time of survival after sustaining burn injuries: Maximum number of deaths happened to be 43.29% within first 12 hours of sustaining injuries, followed by 17.52% within 24-48 hours, 16.49% after 96 hours, 14.43% within 48-96 hours and 8.25% within 12-24 hours.

Correlation between time of survival and percentage of burn

Table 4 Correlation between time of survival and percentage of burn

	Correlation	time	percentage
Time	Pearson Correlation	1	-.352**
	Sig. (2-tailed)		.000
	N	97	97
Percentage	Pearson Correlation	-.352**	1
	Sig. (2-tailed)	.000	
	N	97	97

****.** Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

This systemic review summarizes the epidemiological characteristics of burn injuries in the district of Burdwan, West Bengal. Epidemiological studies are a prerequisite for effective burn prevention programs, because every population seems to have its own epidemiological characteristics and knowledge of epidemiology of burns is needed to select the target groups for preventive actions.

Incident rate of fatal burn injuries in our study was found to be lower than that of another study in Eastern India.¹¹ This may be explained by the fact that only fresh deceased of pure burn injuries was included in our study, not those who are either decomposed or dead due to scalds, electrocution, lightning or radiation injuries. The mean percentage of females was found to be significantly higher in our study and also in another study in an Apex centre of North India.¹² Possible explanations may be the women being nervous and sensitive are more susceptible to burn injuries.¹³ This may be also due to gender difference, socio-cultural factors, dowry problems and their household practices.¹⁴

The common age group in our study was between 20-40 years. This is in concordance with that seen in other studies.^{12, 15} The high figure, with female preponderance, may be due to their household practices and long hours in the kitchen.¹⁶

An increased prevalence of Hindus over other religions is noted in our study and also in another study at Vadodara City.¹⁷ This is supported by the report of Census 2001 in the district of Burdwan.¹⁸

The rural population outnumbered the urban population in our study and also in other studies across the country.^{19, 20} Inadequate power supply in the rural areas leading to the use of kerosene lamps for lighting, weakly designed kerosene stoves, polyester mixed fabrics worn by the rural women, ill-designed huts and scanty medical facilities all contribute to the increased number of fatal burn injuries in the rural population.

The death due to the fatal burn injuries is more in the winter months. Findings of our study are consistent with the study by Ekrami et al, where burns were also found to be more in the winter.²¹ This may be due to the use of fire for warming in the winter days.

Deaths due to dowry problems in our study is in concordance with the National Crime Records Bureau, 2010.²² Low educational levels of women, poor implementation of existing laws, lack of establishment of voluntary associations to decrease the importance of dowries and the absence of community level projects may be the contributing factors to the rising toll of dowry deaths in India.²³

In our study, most of the burn injuries were sustained between 06.00 p.m. to 12.00 midnight. Our results are contrary to the observations by Nabachandra et al, where most of the injuries were at daytime.¹⁵ The increased toll at the night time may be due to ill designed lamps by spilling of kerosene, mosquito nets catching fire from the bedside lamps, unsafe cooking media and in the process of warming themselves in the cold winter months.

In the present study, maximum mortality was within 12 hours of incidence. These observations are in conformity with another study, where it is reported that maximum number of deaths were within first 12 hours of sustaining the injury.¹⁶

It was seen that with increased percentage of burns, the time of survival of the victims decreased. This is consistent with a study from Nigeria which shows decreased survival periods with increased burned surface areas.²⁴

CONCLUSIONS

Legislation, health promotion and appliance design have reduced the incidence of burns, with regulations regarding flame-retardant clothes and furniture, the promotion of smoke alarms, the design of cookers and gas fires, the almost universal use of cordless kettles, and the education of parents to keep their hot water thermostat to sixty degree Celsius all playing their part.²⁵ A vast spectrum of injuries can arise from a burning accident, from the trivial to some of the most dramatic injuries that humans survive. The management of the major burn injury represents a significant challenge to every member of the burns team burns doctors, anaesthetists, ward and theatre nurses, physiotherapists, occupational therapists, dietitians, bacteriologists, physicians, psychiatrists, psychologists and the many ancillary staff whose cleaning and supply services are vital to the successful running of a burn unit. A large burn injury will have a significant effect on the patient's family and friends and the patient's future.

Conflict of Interest: No conflict of interest is associated with this work.

Ethical clearance: Taken.

Source of funding: None declared.

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REFERENCES

1. Afify MM, Mahmoud MF, 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):117-22.
2. Sadeghi-Bazargani H, Maghsoudi H, Ranjbar F, Mashadi-Abdollahi H. Stress disorder and PTSD after burns injuries: a prospective study of predictors of PTSD at Sina Burn Center, Iran. *Neuropsychiatr Dis Treat* 2011;7:425-29.
3. Low AJ. It's Not Just a Burn. Physical and Psychological Problems after Burns. *Acta Universitatis Upsaliensis. Uppsala: Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine* 242; 2007.
4. Sanchez JL, Pereperez SB, Bastida JL, Martinez MM. Cost-utility analysis applied to the treatment of burn patients in a specialized center. *Arch Surg* 2007;142:50-57.
5. de Roche R, de Roche NJ, Debrunner HU, Fischer R. Epidemiological data and costs of burn injuries in workers in Switzerland: an argument for immediate treatment in burn centres. *Burns* 1994;20:58-60.
6. Tripathi S, Basnet SJ. Epidemiology of burn injuries in Nepal: a systemic review. *Burns & Trauma* 2017 April;5(10).
7. Brusselaers N, Monstrey S, Vogelaers D, Hoste E, Blot S. Severe burn injury in Europe: a systematic review of the incidence, etiology, morbidity, and mortality. *Critical Care* 2010 October;14.
8. Chipp E, Walton J, Gorman D, Moiemmen NS. Adherence to referral criteria for burns in the emergency department. *Eplasty* 2008;8.
9. Anwar U, Majumder S, Austin O, Phipps AR. Changing pattern of adult burn referrals to a regional burns centre. *J Burns Care* 2007;28:299-305.
10. Shanmugakrishnan RR, Narayan V, Thirumalaikolundusubramanian P. Epidemiology of burns in a teaching hospital in South India. *Indian J Plast Surg* 2008;41(1):34-37.
11. Chakraborty S, Bisoi S, Chattopadhyay D. A study on demographic and clinical profile of burn patients in an Apex Institute of West Bengal. *Short Communication* 2010 September;54(1):27-9.
12. Batra AK. Burn mortality: recent trends and sociocultural determinants in rural India. *Burns* 2003 May;29(3):270-75.
13. Karmakar RN, editor. *Injury and its Medico-legal aspects. Forensic Medicine and Toxicology*. 3rd ed. India: Academic Publishers; 2007.
14. Haralkar JS, Tapare VS, Rayate MV. Study of socio-demographic profile of burn cases admitted in Shri. *National Journal of Community Medicine* 2011;2(1).
15. Memchoubi P, Nabachandra H. A Study of Burn Deaths in Imphal. *JIAFM* 2007;29(4).
16. Ahmed RU, Mahanta HK. A Study of Histopathological changes of Suprarenal Glands in Cases of Ante-mortem Burn Deaths. *JIAFM* 2015;37(1):62-64.
17. Pathak A, Sharma S. The Study of Un-Natural Female Deaths in Vadodara City. *J Indian Acad Forensic Med* 2010;32(3):220-23.
18. National Informatics Centre(Burdwan District Unit) [Online]. 2002 Aug 16 [cited 2002 Aug 21]; Available from: URL:<http://www.bardhaman.nic.in>
19. Chamania S. Training and burn care in rural India. *Indian Journal of Plastic Surgery* 2010;43(3):126-30.
20. Ghaffar UB, Husain M, Rizvi SJ. Thermal Burn: An Epidemiological Prospective Study. *J Indian Acad Forensic Med* 2008;30(1).
21. Ekrami A, Hemadi A, Latifi M, Kalatar E. Epidemiology of hospitalized burn patients in Teleghani Hospital during 2003-2007. *Bratisl Lek Listy* 2010;111(7):384-88.
22. National Crime Records Bureau [Online]. 2011 Sep 19 [cited 2011 Sep 20]; Available from: URL:<http://ncrb.gov.in>
23. Kumar V, Kanth S. Bride burning. *The Lancet* 2004;364:18-19
24. Olaitan PB, Jiburum BC. Analysis of burn mortality in a burns centre. *Annals of Burns and Fire Disasters* 2006 June;19(2).
- 25.
26. Tyler M, editor. *Burns. Short Practice of Surgery*. 24th ed. Calcutta: Jaypee Brothers; 2004.