Original Article

CLINICO EPIDEMIOLOGICAL STUDY ON BURN VICTIMS: WHAT IS THE CURRENT PICTURE IN A TERTIARY CARE HOSPITAL OF INDIA?

Gandhari Basu[1], Subikas Biswas[2], Chitra Chatterjee[3], Reshmi Mondal[4], Prasanta Kumar Sarkar[5], Kingsuk Sarkar[1]

Financial Support: None declared
Conflict of interest: None declared

How to cite this article:
Basu G, Biswas S, Chatterjee C, Mondal R, Sarkar PK, Sarkar K. Clinico Epidemiological Study on Burn Victims: What is the Current Picture in a Tertiary Care Hospital of India?. Natl J Community Med 2014: 5(3);311-5.

Author's Affiliation:
[1]Assistant Professor, Department of Community Medicine; [2]Associate Professor, Department of Surgery, COM & JNM Hospital, WBUHS, Kalyani; [3]Retired Professor, Department of Community Medicine, Government of West Bengal; [4]Demonstrator, Department of Community Medicine, COM & JNM Hospital, WBUHS, Kalyani; [5]Dept of Forensic & State Medicine, Kolkata Medical College & Hospital

Correspondence:
Dr Gandhari Basu
Email: gandhari.basu@gmail.com

Date of Submission: 28-02-14

Date of Acceptance: 24-05-14

Date of Publication: 30-9-14

ABSTRACT

Background: Globally, burn injuries are one of the major health hazards, caused by a variety of agents such as heat, electricity, radiation, and corrosive substances. In a developing country like India, burn injuries continue to be a challenging problem due to poor medical facilities, lack of safety measures, absence of public awareness, dowry, poverty and illiteracy. The present study was conducted to study epidemiology, clinical presentation of burn victims.

Methods: A descriptive, epidemiological study was done with a pre designed proforma for eight months among 58 cases with thermal injuries. The proforma was translated in local language and informed verbal consent was obtained from the respondent in favorable situation. The accompanying person's consent was taken in other situation.All the information on various aspects of burn related epidemiology was gathered either from the patient or from the accompanying person depending on the severity of case.

Results: Among 58 cases, 46 were females and 12 were males. Illiteracy was present in more than one third subjects. There was significant difference in the incidence for occurrence of burn among different gender,place of residence, education level, occupation, marital status, social class($P<.001$). Accidental outnumbered suicidal etiology. No case of homicide was found. Marital disharmony was the reason in 6 cases. The average TBSA affected was 41.3%. As outcome concerned, 24 died and 8 referred to higher centre having specialized burn unit for better management.

Conclusion: Individual, mass and parenteral, community based preventive health education is the urgent need to combat the situation.

Key words: Burn injury, Epidemiology, Pre designed proforma, TBSA, Etiology

INTRODUCTION

Burns are injuries of skin, mucous membranes and or underlying soft tissue caused by a variety of agents.Burn injuries in recent timesbecame major global public health crisis.[1,2]Burns are the fourth most common type of trauma worldwide[3]Low to middle income countries have 90% of the burn cases.[4]Most burn injuries occur in a domestic setting, with cooking as the most common activity.[5,6] Burns to adult females occur mostly at home, while burns to adult males mostly in outdoor or work locations.[7,8] The elderly are most likely to sustain a burn in the kitchen.[9]The worldwide incidence of fire-related injuries is highest in South-east Asia.[10]The estimated annual burn incidence in India is approximately 6-7 million per year.[11]India recorded 25,467 deaths due to burns during the year 2000.[12]Though the burns mortality has decreased in the recent past, nevertheless, physical and psychological sufferings imposed on the patients can be distressing to the victims as well as to their families. Epidemiological studies are important with respect to the risk factors and the high risk group. With this background the present study was conducted to study epidemiology, clinical presentation, outcomeofthe burn cases in a tertiary care hospital of West Bengal.

METHODS

A descriptive, epidemiological study was carried out in College of Medicine and JNM Hospital, West Bengal for a total of eight months (July' 12 -February' 13) among the burn patients admitted during this period. Burn cases managed and discharged fromcasualty and O.P.D were not included in this study.The initial one month was for preparation and finalization of proforma after pre testing. Then data was collected for a period of six months and the rest one month was kept for analysis and for report writing.A burn injury was diagnosed as per WHO's ICD-10 classification system. It includes injuries caused by exposure to smoke, fire and flames, corrosive agents, electric current, lightning, contact with hot substances.[13]Total body surface area was estimated by rule of nine.[14]

One day of the week was pre fixed for the data collection. The day selected was the admission day of the unit of one investigating author of the surgery department. All the burn patients who were admitted on the pre selected admission day were included in the study.The person accompanying the patient was requested to give information regarding the patient when the respondent was not in state of conversation. Otherwise information gathered from the patient himself. All the information on various aspects of burn related epidemiology was gathered with help of a pre designed, pre tested schedule. The proforma was translated in local language and informed verbal consent was obtained from the respondent in favourable situation. The accompanying person's consent was taken in other situation. Final study population was 58. Prasad's modified socio economic scale 2013[15] was usedfor SES classification. The subjects under study were mainly from local area, but a good number of cases were referred also from peripheral health center for better management.The patients were primarily brought to the emergency and then they were admitted in the surgery ward as per vacancy of bed.Patients were followed to know the final outcome like whether discharged, referred or died.

Statistics: In the statistics portion, the data on different aspects of epidemiology, clinical presentation and outcome of fifty eight (58) burn affected victims was coded and then entered into MS-EXCEL sheet and analysis was carried out with help of mean, percentage and chi square for proportion. The statistical software used were SPSS 22.0 (licensed), STAT CAL. P value < 0.01 considered as statistically significant. Fischer's exact P value was used in every case irrespective of cell number.

RESULTS

A total of fifty eight (58) burn patients were admitted in the hospital during the entire data collection period.Nearly half (43.1%) of the cases were in peak productive period that was between 21 and 40 years. The average age of the subjects was 30.45 years, comprising age group ranging from 2 years to 85 years.Among 58 cases, 46 were females and 12 were males. Majority of them were Hindus as the local area was mainly inhabitated by that religion. Own house residents (69%) clearly outnumbered rented (31%) patients. Majorityof patients (77.6%) were unemployed and the reason may be due to female sex. Among study subjects, more than one third (36.2%) were illiterate and only 3 persons passed higher secondary or had more education. Every 4 subjects out of five came from either lower middle or lower socio economic class as per Prasad's socio economic status classification 2013.[15]Only 12 patients belong to upper, upper middle and middle class. The average PCI per month was Rs.1310.59/-.Regarding marital status it was seen that 75 % were married while rest were either unmarried or widow or not living with partner. There was significant difference in the incidence for occurrence of burn among different gender,place of residence, education level, occupation, marital status, social class ($P < .001$)(Table.1). Nearlyhalf of the subjects were admitted in winter season. Less number of patients (20.8%) was admittedduring rainy season. The peak time of admission was 8 p.m. to 11 p.m.More number (26, 44.9%) of incidents took places between 5pm and 10 p.m.While interrogating it was seen that, out of 58 patients, 53(91.4%) were at home during fire caught them. At the time when fire caught them, 64.2% had synthetic clothing while only 5 subjects were wearing full cotton clothing. Accidental or incidentalcame out as the major etiology (86.2%) in comparison with suicidal nature (13.8%).No case of homicide was found.Accidental reasons included kerosene stove burst, catching fire while cooking food and lighting lamps in evening, fire accident in industries. Marital disharmony was the reason in 6 cases out of eight (8) suicidal cases. No suicidal note was obtained.(Table.2) According to the total body surface area affected(TBSA),it was noticed that 14 persons had TBSA <=20%,20 persons had TBSA between 21 - 40%.The range of total body surface area affected was between 40% to 60% among twenty two (22) burn victims.(Table.3) The average body surface area affected was 41.3%. The most affected area was upper limbs (36.3%) followed by lower limbs (23.7%) and trunk whereas the major affected area was more than one.It was seen that, 34 out of 58 (58.6%) victims i.e.had TBSA within 40% and the nature of injury was either accidental or incidental while in all suicidal cases the percentage of body surface area was more than 40% and this difference was found statistically significant. The mean TBSA was highest (46.2%) for the age group21 years to 40 years and among female subjects in comparison with males (44.3% vs. 29.5%). (Table.4)The interrogation revealed that the fire was extinguished with help of pouring water in 36 (62.1%) cases while in 16 (37.9%) victims, bed sheets or blankets were used as main mode of fire quencher and they also were made to roll in the ground.After the victims brought in the hospital, initial wound toileting was carried out for every patient and all of them received Tetanus Toxoid irrespective of their prior vaccination status.

Table 1: Population profile (N = 58)

Variables	Number (%)	x^2 (df)), value
Age group (yrs)		
<= 20	19 (32.8)	3.13 (2), 0.233
21 – 40	25 (43.1)	
>40	14 (24.1)	
Gender		
Male	12 (20.7)	19.93 (1), <0.01
Female	46 (79.3)	
Religion		
Hindu	55 (94.8)	46.62 (1), <0.01
Muslim	3 (5.2)	
Type of family		
Nuclear	32 (55.2)	0.62 (1), 0.512
Joint	26 (44.8)	
No. of family members		
<= 4	28(48.3)	0.06 (1), 0.896
>= 5	30 (51.7)	
Residence		
Own house	40 (69.0)	33.24 (1), < 0.01
Rented house /slum	18 (31)	
Marital status		
Married	43 (74.1)	13.51 (1), < 0.01
Single#	15 (25.9)	
Education		
Illiterate /Just literate	21(36.2)	34.58 (4), <0.01
Primary	12(20.7)	
Middle/ secondary	22(37.9)	
HS / above	3(5.1)	
Occupation		
Non-working class	45 (77.6)	17.65 (1), <0.01
Working class	13 (22.4)	
Socio economic class*		
I (upper)	2(3.4)	39.58 (4), <0.01
II(upper middle)	6(10.3)	
III(middle)	4(6.9)	
IV(lower middle)	20(34.5)	
V(lower)	26(44.8)	

HS =higher secondary; NA = Not applicable; *(Prasad's scale modified 2013); #Unmarried/Separated/widow

Table 2: Burn related epidemiology (N = 58)

Parameters	Responses (%)
Etiology	
Accidental	50 (86.2)
Suicidal	8 (13.8)
Scald	
Present	44 (75.9)
Absent	14 (24.1)
Family dispute	
Present	10 (17.2)
Absent	48 (82.8)
Suicidal note	
Present	0
Absent	58 (100.0)

Table 3: Percentage of burns as per Total Body Surface Area affected (N=58)

TBSA (%)	Number (%)
<=20	14 (24.1)
21-40	20 (34.5)
41-60	11 (19.0)
61-80	11 (19.0)
>80	2 (3.4)

For cleaning, soap and water was used and all the superficial debris and blisters were removed. Ringer's Lactate solution was used for maintaining fluid balance. Dressing was carried out with topical antimicrobials. Either iv ciprofloxacin, 3rdgeneration cephalosporin or combination was used depending on the case to combat the infection. Moist oxygen inhalation required by many subjects in addition.As per clinical outcome was concerned, 24(41.2%) died, 8 (13.8%) referred to higher centre having specialised burn unit for better management, rest were discharged with mild scars and some sort of functional disability. (Table 5)

Table 4: Age group, gender and mean TBSA

Variable	Sex		Mean TBSA
	Male	Female	
Age group (yrs)			
<=20	2	17	37.7
21 – 40	4	21	46.2
>40	6	8	37.1
Sex			
Male			29.5
Female			44.3

Table 5: Management and outcome of burn patients (N = 58)

Management	Frequency
Fire extinguisher method / initial step	
Pouring water	33 (56.9)
Covering with bed sheets/blanket	16 (27.6)
Both	9(15.4)
Place of initial medical management	
Directly brought to hospital/health facility	48 (82.8)
Consultation with local doctor	7 (12.1)
First aid at home	3(5.2)
Initial medical management at health facility	
Ointment	7 (12.1)
Analgesic	3 (5.2)
Iv fluid	2 (3.4)
Any combination	46(79.3)
Outcome	
Died	24(41.4)
Discharged with disability	16(27.6)
Referred to higher centre	8 (13.8)
Discharged with mild scars	10 (17.2)

Figure in bracket indicate percentage

DISCUSSION

In the present descriptive, epidemiological, hospital based study, a total of fifty eight burn patients were admitted in the surgery department of a tertiary care hospital of West Bengal on a fixed day each week for a period of six months. The study revealed that majority of patients was between 21 years to 40 years that corroborates with the results of the study done in Surgery Ward of ShriChhatrapatiShivajiMaharaj General Hospital [16] and also with the study of B P Sarma and N Sarma. [17] The female population were more affected than opposite sex (4:1) similarly like in the study by Sarma (3:1) and others.[18,19] The reasons might be gen-

der difference, socio-cultural factors and mostly women stayed at home and therefore chancesof fire contact was more. The study from plastic surgery department of South India [20] had subjects ranging from three to 75 years like the present study (two to 85 years).The mean (±SD) age was quite neck to neck like 31.58 (±11.64) years for males and 30.18 (±15.60) years for females in a Pakistan study [21] whereas in our study there was difference in the mean (±SD) age of both sexes (41.50±21.15yrs vs. 27.57±17.71years). The difference could be due to less number of participants in the present study. However, men in the age group more than 40 years and women aged 21 to 40 yearssuffered from burns more than the other age groups.TBSA observed among the age group 21 to 40 years was the highest (46.2%) and was mainly accidental or incidental in nature and the findings were quite similar with the results of a South Indian study.[20] Majority of patients (77.6%) were unemployedand among the non-working class, housewives outnumbered the others. M Subramamyam[22] found that half of the patients were housewives and maids. The more incidence attributed to injury prone atmosphere while cooking. Among 58 patients, 36.2% were illiterate or just literate and this was quite less in comparison to the study in Solapur.[16] Majority of the cases (79.3%) were from class IV and class V (Upper Lower and lower) socioeconomic group and the occurrence of burn among them was statistically significant as in Solapur study[16] and Subramanyam study.[22] .The poor standard of living in low SE group making persons prone to the injury.Majority of the study population were married (74.1%) and the findings corroborated with other study. [16, 22]The higher proportion among married people may be due to the fact that married women were mostly housewives and they did the family cooking in the kitchen and kitchen was the place where most accidents took place. The seasonal variation found in the present study i.e. winter season (Oct to Dec) outnumbered the admission rate than rainy season was similar like is Solapur study.[16]The increased incidence could be due to Diwali, other festivals. The timings of the incident wasalso similar with the previous study. In contrast to our findings, some study 14 found that maximum no. of burns took place between 6 am and 2 pm in contrast of5 p.m. to 10 p.m. Maximum no. burn cases were accidental (86.2%) in nature in the present study similar with Solapur study.[16] Accidental burns were common and the reason might be carelessness, familial stress, lack of any safety measures, synthetic clothing while in kitchen and also due to cooking at floor level. 24 persons died , 27.6% discharged with disability, 8 (13.8%) referred to higher centre and 10 were discharged with minor scars. While in Solapur study 65.78% died, 16.44% weredischarged against medical advice, 13.78% were discharged with complete cure and 4% were discharged with residual functional disability. L.M. Bariar et al [23]in their study found that 41% patients were discharged, 39.5% patients expired and 19.5% left against medical advice.Burn injury is public health problem of great importance. It mostly affects women at home, during cooking in the evening.Hazardous cooking practice and carelessness are the important causes of accidental nature of burn injury. Individual, mass and parenteral, community based preventive health education is the urgent need to combat the situation. Print and electronic media should take active part for spreading awareness and an integrated, comprehensive, need based program must be there to tackle the situation.

ACKNOWLEDGEMENTS

Our sincere thanks to Dr Suman Kumar Roy, Prof.& Head of the Department of Community Medicine for his valuable suggestion during analysis and report writing. We also like to thank the relatives of the patients and also the affected victims for their participation.

REFERENCES

1. Forjuoh SN. Burns in low- and middle-income countries: a review of available literature on descriptive epidemiology, risk factors, treatment, and prevention. Burns 2006; 32:529.
2. Peck MD, Kruger GE, Van DerMerwe AE, et al. Burns and fires from non-electric domestic appliances in low and middle income countries Part I. The scope of the problem. Burns 2008; 34:303.
3. World Health Organization. The Global Burden of Disease: 2004 Update. World Health Organization, Geneva 2008.
4. Murray CJL, Lopez, AD. The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020, World Health Organization, Swizerland 2006.
5. Center for Disease Control. Fire deaths and injuries: Fact sheet overview 2008 www.cdc.gov/HomeandRecreationalSafety/Fire-Prevention/fires-factsheet.html.
6. Attia AF, Sherif AA, Mandil AM et al. Epidemiological and sociocultural study of burn patients in Alexandria, Egypt. Eastern Mediterranean Health Journal 1997; 3:452.
7. Hemeda M, Maher A, Mabrouk A. Epidemiology of burns admitted to Ain Shams University Burns Unit, Cairo, Egypt. Burns 2003; 29:353.
8. Davies JW. The problems of burns in India. Burns 1990; (Suppl)1:S1.
9. Mabrouk A, Maher A, Nasser S. An epidemiologic study of elderly burn patients in Ain Shams University Burn Unit, Cairo, Egypt. Burns 2003; 29:687.
10. World Health Organization. Global Burden of Disease 2004 Summary Tables. Geneva, World Health Organization, 2008.
11. Gupta J L, Makhija L K, Bajaj S P.Ind J PlastSurg2010; 43(Suppl): pp: 6–10.
12. Park K. 18th. Jabalpur Banarasidas: Bhanot Publishers; 2005. Text Book of Preventive and Social Medicine, 18 thed.Jabalpur: Banarasidas, Bhanot Publishers; 2005; p. 324.
13. WHO. International Statistical Classificationof Diseases and Related Health Problems,10th Revision, Version .2006; Available from http: // www.who.int /classifications/apps/icd/icd10online.
14. Warden GD, Heimbach DM. Burns. In: Schwartz SI, Shires GT, Spencer FC, eds. Principles of surgery, 7th ed. New York, McGraw–Hill, 1999:223–62.
15. Dudala S R, Arlappa N. An updated Prasad's socio economic status classification for 2013. Int J Res Dev Health.2013; 1(2); pp:26-28.

16. Jagannath H R, Vinay S T, Madhavi V R. Study of socio-demographic profile of burn cases admitted in shrichhatra-patishivajimaharaj general hospital, solapur. Nat J Com Med 2011; 2(1); pp:19-23.

17. B. P. Sarma and N. Sarma. Epidemiology, morbidity,mortality and treatment of burn injuries – a study in a peripheral industrial hospital. Burns ;1994; 20(3):5.

18. Dalbir Singh et al. Burn mortality in Chandigarh Zone :25 years autopsy experience form a tertiary care hospital of India. Burns,1998; 24(2);150 – 6.

19. D. Marsh et al. Epidemiology of adults hospitalized with burns in Karachi , Pakistan. Burns;1996; 22 (3): 225 – 9.

20. Shanmugakrishnan R R, Narayanan V, and Thirumalaikolun-dusubramanian P. Epidemiology of burns in a teaching hospital in South India. Indian J Plast Surg;2008 ; 41(1):34–37.

21. Aslam M, Niazi M Z, Mustafa G. Pattern of burns at lady reading hospital, Peshwar. JPMI; 2012;26(2):221-225.

22. Subramanyam M. Epidemiology of burns in a district hospital in Western India, Burns , 1996; 22(6),439 – 42.

23. L. M. Bariar : Review of 400 cases of burns at Aligarh,Indian Journal of Burns,1994; 2(1) , 35 – 40.