

Epidemiological Study of Burn Injuries Admitted in Two Hospitals of North Karnataka

Gowri Shankar, Vijaya A Naik¹, Rajesh Powar²

Department of Community Medicine, S N Medical College, Navanagar, Bagalkot, ¹Department of Community Medicine, J N Medical College, Belgaum, ²KLES, Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum, Karnataka, India

Introduction

Injuries generally have continued to attract the attention of researchers all over the world. Burn injuries rank among the most severe types of injuries suffered by the human body with an attendant high mortality and morbidity rate.⁽¹⁾ The global estimate of burn injury-related deaths in 2002 was 3,12,000 and contributed to 0.5% of all causes of deaths. An estimated 1,84,000 persons died of burn injuries in the countries of South East Asia Region (SEAR) in 2002 with 6.55 million disability adjusted life years (DALY) lost due to burns. The fire-related mortality in the SEAR accounts for more than half of the global burden of fire-related burns. About two-thirds of the global burden of fire-related burns among females was estimated to have occurred in SEAR. India recorded 25,467 deaths due to burns during the year 2000.⁽²⁾

As India moves forward in its quest for growth, development, and economic prosperity, the dark and ugly side of this progress is rapidly emerging due to the absence of accompanying safety systems.⁽³⁾ As the etiologic factors of burn injuries vary considerably in different communities, careful analysis of the pattern in every community is needed before a sound prevention program can be planned and implemented. Hence, this study was conducted to assess demographic and sociocultural factors responsible for the burn injuries, the type modes, causes, and risk factors for burn injuries and to study the outcome.

Materials and Methods

A 1-year cross-sectional study of all burn injury patients admitted in two tertiary care hospitals of Belgaum City was conducted between 2004 and 2005. The ethical clearance was obtained from the institutional ethical committee. For the purpose of the study, the term burn injury was defined as a body lesion due to an external cause, either intentional (alleged homicidal or suicidal) or unintentional (alleged accidental) resulting from a sudden exposure to energy (mechanical, electrical, thermal, chemical, or radiant) generated by agent-host interaction.⁽⁴⁾ Data was obtained by a face to face interview with the patients or their relatives and recorded on a predesigned and pretested questionnaire and analyzed using chi square test and percentages.

Results

A total of 316 patients with burn injuries were admitted at both the hospitals during the study period. Majority of the patients were females (54.7%). The male-to-female ratio was 0.8:1. The mean age was 27.81 ± 15.77 years ranging from 4 months to 95 years. Majority (69.60%) of the burn cases were between 15 and 44 years of age followed by children less than 14 years of age (17.1%) [Table 1]. Majority (30.5%) of the burn cases were illiterate ($P = 0.002$) and unskilled workers (41.3%). Most (41.5%) of the patients belonged to the Class V socioeconomic status. Maximum number of females sustained burn injuries at home compared to males (94.8% and 58.7% respectively; $P = 0.000$).

Majority of the burn cases (68.0%) were from rural areas and out of the total domestic burns, 77.5% occurred in the kitchen, kitchen cum living room, and kitchen cum bathroom. Most of the patients (46.4%) were living in *kutchra* and overcrowded homes (54%). Out of the total injuries, 31.0% occurred between 4 pm and 8 pm ($P = 0.000$). Synthetic clothing was worn by 46.5% of the

Access this article online

Quick Response Code:



Website:

www.ijcm.org.in

DOI:

10.4103/0970-0218.74363

Address for correspondence:

Dr. Gowri Shankar, Assistant Professor, Department of Community Medicine, S N Medical College, Navanagar, Bagalkot - 587102, Karnataka, India.
E-mail: gowrieshwarkalburgi@yahoo.co.in

Received: 02-01-09, Accepted: 16-06-10

victims. Among the female patients, 71.7% were wearing synthetic clothing at the time of burn ($P = 0.000$). Majority (81.6%) of the burn injuries were allegedly accidental. Flame injuries contributed to 82.3% of the total cases [Table 2]. The overall mortality was 41.6%. Among the total deaths, 77.0% were females and 23% were males ($P = 0.000$). Majority of female victims (58.5%) had TBSA more than 40% whereas 74.9% of the male patients had a total burn surface area <39% ($P = 0.000$).

Discussion

The epidemiology of burns varies from one part of the world to another as it depends on the level of civilization, industrialization, and culture among other things.⁽¹⁾ Also the lack of uniformity between methodologies in addition to the existence of a plethora of variables and differences in the periods of study makes any comparison with other studies difficult.⁽⁵⁾ Burn injuries and their related morbidity, disability, and mortality represent a public health problem of increasing importance in developing countries.⁽⁶⁾

In the present study, more than 50% of the burn injury admissions were females. This finding is similar to studies undertaken in various hospitals all over India.⁽⁷⁻⁹⁾ This could be attributed to the male dominant society and females' close proximity to fire throughout the day and night. Almost 70% of patients were between 15 and 44

years of age, which is similar to other studies.^(6,10) This is the productive age when they are generally active and are exposed to hazardous situations both at home and at work. In this study, children less than 14 years of age contributed to 17.1% of the total cases which is similar to another report.⁽¹¹⁾

In this study, 30.5% were illiterates. Illiteracy was higher in females (39.1%) than in males (19.8%). Similar findings were reported in studies conducted at Pune⁽¹⁰⁾ and Egypt.⁽⁶⁾ These findings suggest that the education level of the people has an impact on the incidence of burn injuries. In the present study, most of the burn victims (64.1%) were housewives. Similar findings have been observed in a study conducted at Egypt.⁽⁶⁾ The vulnerability of housewives to burn injuries is due to the fact that they are in close proximity to open, unguarded fires while cooking.

Most of the burn victims (41.5%) had Class V socioeconomic status under modified BG Prasad classification. The proportion of burn injuries decreased with the rise in the economic status of the individual. These findings were comparable to studies conducted in Chandigarh⁽⁹⁾ and Pune.⁽¹⁰⁾ This could be due to the use of cheap and unstable pressure stoves, open fires, adulterated kerosene, financial problems, floor-level cooking, and kerosene lamp/bottle.

In this study, 94.8% of burn injuries in females occurred at home and 5.2% outdoors whereas in males, 58.7%

Table 1: Age and sex distribution of burn patients

| Age in years | Male | | Female | | Total | |
|--------------|------|------------|--------|------------|-------|------------|
| | No. | Percentage | No. | Percentage | No. | Percentage |
| <14 | 029 | 20.3 | 025 | 14.4 | 054 | 17.1 |
| 15-44 | 095 | 66.4 | 125 | 72.3 | 220 | 69.6 |
| 45-64 | 016 | 11.2 | 015 | 08.7 | 031 | 09.8 |
| ≥ 65 | 003 | 02.1 | 008 | 04.6 | 011 | 03.5 |
| Total | 143 | 100 | 173 | 100 | 316 | 100 |
| Percentage | 45.3 | | 54.7 | | 100 | |

$\chi^2 = 2.548$, dF = 1, $P > 0.05$

Table 2: Distribution of burn cases according to the types and source of the burn

| Type of burn | Source of burn | Male | | Female | | Total | |
|--------------|--------------------------|------|------------|--------|------------|-------|------------|
| | | No. | Percentage | No. | Percentage | No. | Percentage |
| Flame | Cooking appliance | 030 | 20.9 | 089 | 51.2 | 119 | 37.6 |
| | Sigri | 003 | 2.1 | 002 | 01.2 | 005 | 01.6 |
| | Kerosene oil and matches | 029 | 20.3 | 041 | 23.7 | 070 | 22.3 |
| | Kerosene lamp/bottle/can | 013 | 9.1 | 021 | 12.1 | 034 | 10.7 |
| | Fire works | 001 | 0.7 | 000 | 00.0 | 001 | 00.3 |
| | Petrol/diesel explosion | 022 | 15.4 | 002 | 01.2 | 024 | 07.6 |
| | Candle | 002 | 1.4 | 001 | 00.6 | 003 | 00.9 |
| | Miscellaneous | 003 | 2.1 | 001 | 00.6 | 004 | 01.3 |
| | Total | 103 | 72.0 | 157 | 90.6 | 260 | 82.3 |
| Scalds | Hot water/oil/milk/tea | 019 | 13.3 | 014 | 08.2 | 033 | 10.5 |
| Elect. | Livewire/short circuit | 017 | 11.9 | 002 | 01.2 | 019 | 06.0 |
| Misc. | Chem./mech./thunder | 004 | 2.8 | 000 | 00.0 | 004 | 01.2 |
| Total | | 143 | 100 | 173 | 100 | 316 | 100 |

sustained burns at home and 41.3% outdoors. This figure is comparable to other reports from developing countries, including India.^(10,13) This indicates that home is a dangerous place for burn injuries to occur as appliances are continuously being used for cooking, heating, and lighting purposes without proper precautions. Most (68%) of the burn victims were from rural areas whereas a similar Indian study reports 56.6% cases from rural area.⁽¹⁴⁾ This could be attributed to their low standard of living and related factors. In the present study, majority (46.4%) of patients were living in *kutch* houses whereas an Indian study reports that 65% of the victims were staying in similar houses.⁽¹⁰⁾ These findings suggest that *kutch* houses have no facilities for safe cooking and heating, leading them to become a risk factor for burn injuries. Most of the burn victims (54%) were living in overcrowded homes whereas another Indian study reports that 87.2% of patients lived in overcrowded homes.⁽¹⁰⁾ This implicates unsafe cooking, heating, and sleeping practices in cramped houses making the victim vulnerable to burn injury.

In this study, 77.5% of domestic burns occurred in the kitchen. About one-third of burn injuries occurred between 4 pm and 8 pm. These findings were similar to a study conducted in Pune.⁽¹⁰⁾ All these findings indicate that the kitchen is a danger zone in every home where there are unsafe cooking appliances and there is a need for education in this respect. This period coincides with the time to prepare the meals at home. It was observed that 46.5% of the burn victims were wearing synthetic clothing at the time of burn. It was also observed that majority of the females (71.7%) were wearing synthetic clothes at the time of the burn incident. This was also true for a study conducted in Aligarh.⁽¹⁵⁾ Synthetic clothes catch fire easily and flare upward resulting in difficulty for the victim to save oneself from the burn injury.

Alleged accidental burns accounted for 81.6%. This could be attributed to the carelessness of individuals while handling fire. Flame was the most common agent, responsible for more than two-thirds of cases (82.3%). Similar results have been reported from India,⁽¹⁶⁻¹⁸⁾ and other countries.^(1,6,12,19) As regards the source of flame, a cooking appliance was the most common cause and responsible for more than half (51.2%) cases in females.

The overall mortality was 41.6%. More than 50% of the females had died whereas majority of the males (66.1%) had survived. This is similar to a study conducted in Sangli, Maharashtra.⁽¹⁷⁾ Three-fourths of the patients who died were females with TBSA more than 40%. In the Nagpur study, burns with more than 40% TBSA were more common in females (65%).⁽¹⁸⁾ These findings are apparent as women work in the kitchen with floor-level unsafe cooking appliances and wear loose synthetic

clothes which catch fire since majority of the time they are alone at home and are ignorant about first aid and succumbed to extensive burn injury.

Hence, relevant, cost-effective, culture-specific, and sustainable interventions should be developed for burn injury prevention and control. The interventions can be translated into action through the four Es of injury prevention and control, namely, education, engineering, enforcement, and emergency care.

Conclusion

Burn injuries are a serious public health problem with alarmingly high mortality and morbidity. These injuries are preventable through design and promotion of more aggressive prevention programs especially for flame injuries occurring in the home environment.

References

1. Obalanji JK, Oginni FO, Bankole JO, Olaside AA. A ten - year review of burn cases seen in a Nigerian Teaching Hospital. *J Burns Wounds* 2003;2:1. Available from: <http://www.journalofburns.com>. [last cited on 2003 Nov 08]
2. Park K. Text Book of Preventive and Social Medicine, 18th ed. Jabalpur: Banarasidas, Bhanot Publishers; 2005. p. 324.
3. Gururaj G. Injuries in India - A national perspective. Burden of disease in India, National Commission on macroeconomics and health. New Delhi: MOHFW, Govt. of India; 2005. p. 326.
4. Thacker SB, Mackenzie EJ. Injury prevention and control. *Epidemiol Rev* 2003;25:1-2.
5. El - Gallal AR, Yousef SM, Toweir AA. Burn injuries in Benghazi. Eight years study. *Ann Burns Fire Disasters* 1998;11:198-202.
6. Attia AF, Sherif AA, Mandil AM, Massoud NM, Arafa MA, Mervat W, et al. Epidemiological and sociocultural study of burn patients in Alexandria, Egypt. *East Mediterr Health J* 1997;3:452-61.
7. Gupta RK, Srivastava AK. Study of fatal burn cases in Kanpur, India. *Forensic Sci Int* 1988;37:81-9.
8. Haralkar SJ, Rayate MV. Sociodemographic profile of burn cases admitted in Shri. Chatrapati Shivaji Maharaj General Hospital Solapur. Souvenir of 31st Annual National conference of IAPSM, Chandigarh: 2004.
9. Singh D, Sing A, Sharma AK, Sodhi L. Burn mortality in Chandigarh zone: 25 years autopsy experience from a tertiary care hospital of India. *Burns* 1998;24:150-6.
10. Singh MV, Ganguli SK, Aiyanna BM. A study of epidemiological aspects of burn injuries. *Med J Armed Forces India* 1996;52: 229-32.
11. Gupte S. Text book of pediatric emergencies. 1st ed. New Delhi: Peepee Publishers and Distributors (P) Ltd; 2005.
12. Kobayashi K, Ikeda H, Higuchi R, Nozaki M, Urabe M, Hamabe Y, et al. Epidemiological and outcome characteristics of major burns in Tokyo. *Burns* 2005;31:S3-11.
13. Kumar P, Chaddha A. Epidemiological study of burn cases and their mortality experiences amongst adults from a tertiary level care center. *Indian J Commun Med* 1997;22:160-7.
14. Das A, Pattankar JV. Epidemiological study of burn cases admitted in two hospitals of Gulbarga city. MD Dissertation, Bangalore: RGUHS; 2004.
15. Mago V, Yaseen M, Bariar LM. Epidemiology and mortality of burns. *Indian J Commun Med* 2004;29:187 and 91.

16. Bilwani PK, Gupta R. The epidemiological profile of burn patients in 2.6 Hospital Ahmedabad. *Indian J Burns* 2003;11:63-4.
17. Subrahmanyam M, Joshi AV. Analysis of burn injuries treated during a one year period at a district hospital in India. *Ann Burns Fire Disasters* 2003;16:74-6.
18. Naralwar UW, Badge PS, Meshram FA. Epidemiological determinants of burns and its outcome in Nagpur, Maharashtra, India. Souvenir of 31st Annual National Conference of IAPSM, Chandigarh: 2004.
19. Stuart PP. Burn epidemiology in the Brisbane and Queensland area. *Burns* 2005;31:S27-31.

Source of Support: Nil, **Conflict of Interest:** None declared.