Epidemiological Study of Hospitalized Burn Patients in a Burn Care Unit of Bangladesh

*Hamid MA,[1] Mukit SM,[2] Sultana SN,[3] Biswas G[4]

Abstract

Introduction: The epidemiology of hospitalized burn victims have providedimportant informationsin most South Asian countries, accept from Bangladesh. Where national injury surveillance is absent, analysis of hospitalized data can be useful for planning prevention strategies.

Objective: This study is aimed to analyze epidemiological characteristics of hospitalized acute burn patient.

Methods: Burn patients' data including flames, scalds and electrical burn were obtained through regularly collected records maintaining by the burn care unit of Rangpur Medical College Hospital, a regional tertiary hospital located in Northern Bangladesh. All patients were attending both indoor and outdoor sustaining acute burn between January 2023 and December 2023 was included in the analysis. This is a retrospective study and data were collected from hospital registers. Standard statistical calculations such mean, median and standard deviation (SD) were calculated where applicable. P-value of <.05 were considered as statistically significant level.

Results: A total of 530 burn patients with median age of 24 years were admitted in the study period.There were 354 females and 176 males with a ratio of 1.5:1. Majority of female were housewife (45.4%) and had burn 16-30% total body surface areas ($p<0.01$). Age-distribution of patients showed a peak between 18-44 years (54.2%) followed by 0-17years age group (28.4%). Most burn injuries were 3rd degree followed by 2nd degree. Flame burns were leading type of burn followed by scalds. Among the flame burn, it was mostly associated with clothing (85.1%), in female (90.6%), in male (66.1%). Domestic burns (87.8%) were more than the working place (11.9%). Among the causes, fire camp (44.6%) in winter was the key factor, cooking with wood (14.1%), electrical burns (7.6%) played significant role in burn. Only in a single month January, 40% of burns occurred. Overall, mortality rate was 7.5% (female 24 cases and male 10 cases) among the patients with median age of 32.1 years. Patients died from 18% TBSA and onward.

Conclusions: Young females, women roles in households and indoor environment were major epidemiological characteristics of burn injuries among hospitalized patients, largely caused by fire and flames. High burn severity and case fatality by low level of burn injury (TBSA) demand further burn care improvement, preventive measures, and first aids education in lower economic settings, where Bangladesh is an example.

[Dinajpur Medical College Journal, 2025 Jan; 18 (1):3-11]
[Former M Abdur Rahim Medical College Journal]
DOI: https://www.doi.org/10.69861/djmcj2025v18i1s2

Keywords: Burns, Epidemiology, Fire and Flame

1. *Dr M A Hamid, Associate Professor of Plastic Surgery. National Institute Burn & Plastic Surgery.. hamiddr54@gmail.com*
2. *Dr. Shah Md. Al Mukit, Assistant Registrar, Department of Plastic Surgery, Rangpur Medical College Hospital, Rangpur, Bangladesh*
3. *Dr. Sayeda Niger Sultana, Assistant Professor, Department of Gynecology and Obstetrics,Prime Medical College Hospital, Rangpur, Bangladesh*
4. *Dr. Goutam Biswas, Junior Consultant, Department of Anesthesia,Rangpur Medical College Hospital, Rangpur, Bangladesh*

**For correspondence*

Introduction

National surveillance data and large survey data on burn injuries are not available in most low-income (LICs) and lower middle-income countries (LMICs), hospitalized data have been found to be a valuable source of information for identifying the epidemiological characteristics of burn injuries. Most burn injuries, especially the minor ones, are taken care of by the patients or person closed to the patients, with the advice from pharmacists or local religious healers while many more are treated by the health professionals in a non-hospital settings. Those who seek support to hospital cares often have serious burn injuries, are the small fraction of the total burn victims. However, the epidemiological data of the hospitalized burns can provide insight into the pattern of injury, which appears to be important for burn prevention and care in low-income countries.[1]

According to the WHO statistics on burns, more than a million people are either moderately or severely burnt in India and over 173000 children (<18 year) suffer from such injuries in Bangladesh (WHO, Key facts).A global study reported that among the hospitalized pediatric burns, Asian countries bear more than half of the global pediatric burn population[2]. In Bangladesh, a few studies that have reported on the epidemiology of burns come from studies focusing on pediatric burns (scalds and flames) using household surveys. These studies have identified burns as a major cause of illness including permanent disability among children in Bangladesh[3] .These studies also report demographic variability in burn injuries, i.e. young and female children, and children residing rural area were more likely to have higher risk of burn injuries

Methods

Burn and Plastic Surgery unit of Rangpur Medical College Hospital is one of the largest burn care facility in Bangladesh. The 50-bed burn unit also facilitates 16 available beds for Intensive Care Unit (ICU) to treat severe burn victims. The serves a population of about 20 million people in the region of northern Bangladesh. The burn unit is run under the supervision of Ministry of Health and Family Welfare. Data used in the current study is retrieved from prospectively collected hospital register of patients with burn injuries admitted to the unit of the hospital.

Information on all types of burn injuries including scald, electric- and fire-burns are maintained in a burn registry within the regular hospital activities. For this specific study, burns data which was collected between January 2023 and December2023 was included. All cases of acute unintentional burn attending both indoor and outdoor services were registered by ages and sexes. Further information of patients' occupations, mechanisms of burns, (causes of burns, e.g. scald, flame, inhalation, electric), place of injury, etiology of burns, extent and thickness/ total body surface area (TBSA), bodily region of involvement, and months were collected. Post burn residual complication (contracture, hypertrophic scar, keloid, Marzolin ulcer, hypopigmentation etc.) and sun burn radiation injury were excluded. Injuries related to violence including self-inflicted and inter-personal violence were also excluded due to medico-legal reasons.

All data were compiled in a major table first. Standard statistical formula was used and analysis was done by MS-Excel of computer. Mean, median and standard deviation (SD) were calculated where applicable. Chi squire test was used as a test of significance and P value of <.05 was considered to be statistically significant. Ethical permission was taken from the institutional board at Rangpur Medical College.

Results

A total of 530 burn patients with median age of 24 years were admitted in the study period.

There were 354 females and 176 males with a ratio of 1.5:1. Majority of female were housewife (45.4%) and had burn 16-30% total body surface areas ($p<0.01$). Age-distribution of patients showed a peak between 18-44 years (54.2%) followed by 0-17years age group (28.4%). Most burn injuries were 3rd degree followed by 2nd degree. Flame burns were leading type of burn followed by scalds. Among the flame burn, it was mostly associated with clothing (85.3%), in female (90.6%), in male (66.7%). Domestic burns (87.8%) were more than the working place (11.9%). Among the causes, fire camp (44.6%) in winter was the key factor, cooking with wood (14.1%), electrical burns (7.6%) played significant role in burn. Only in a single month January, 42% of burns occurred. Overall, mortality rate was 7.5% (female 20 cases and male 14 cases) among the patients with median age of 32.1 years. Patients died from 25% TBSA and onward

Burns by age and sex

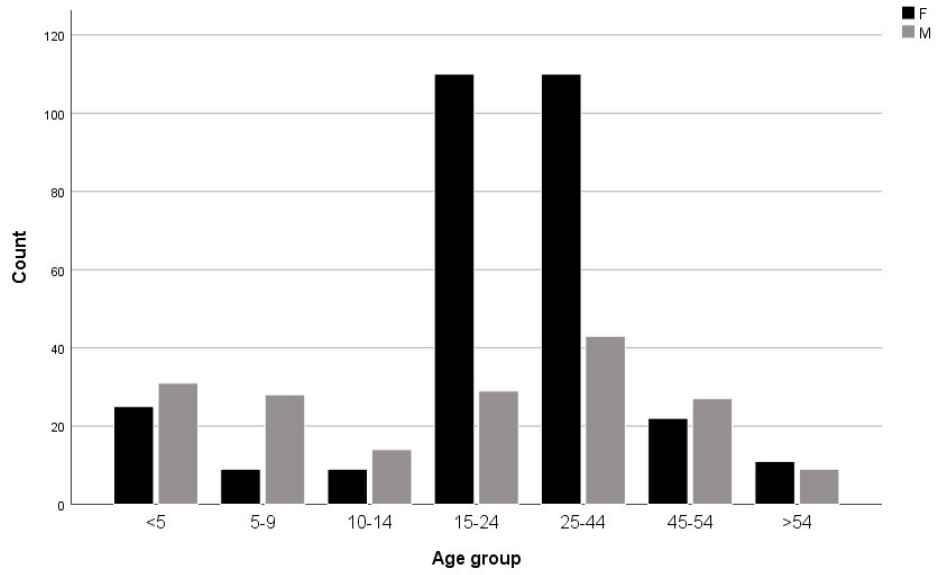

Figure 1. Distribution of burn patients by age and sex (N=530)

When analyzing fire burns only, somewhat similar age-specific pattern were seen by sex with higher fire burns among aged 15-44 years. However, females were overrepresented in all age-specific groups, except age groups 45-54 and 54+ years.

Types of burns

Fire and flames were the most common type of burns, followed by scalds and electrical burns. While, flame burns were more common among females (78.6%) compare to males (21.4%), scalds were common among males (63%) compare to females (37%). Electrical and contact burns were higher among males than females

.

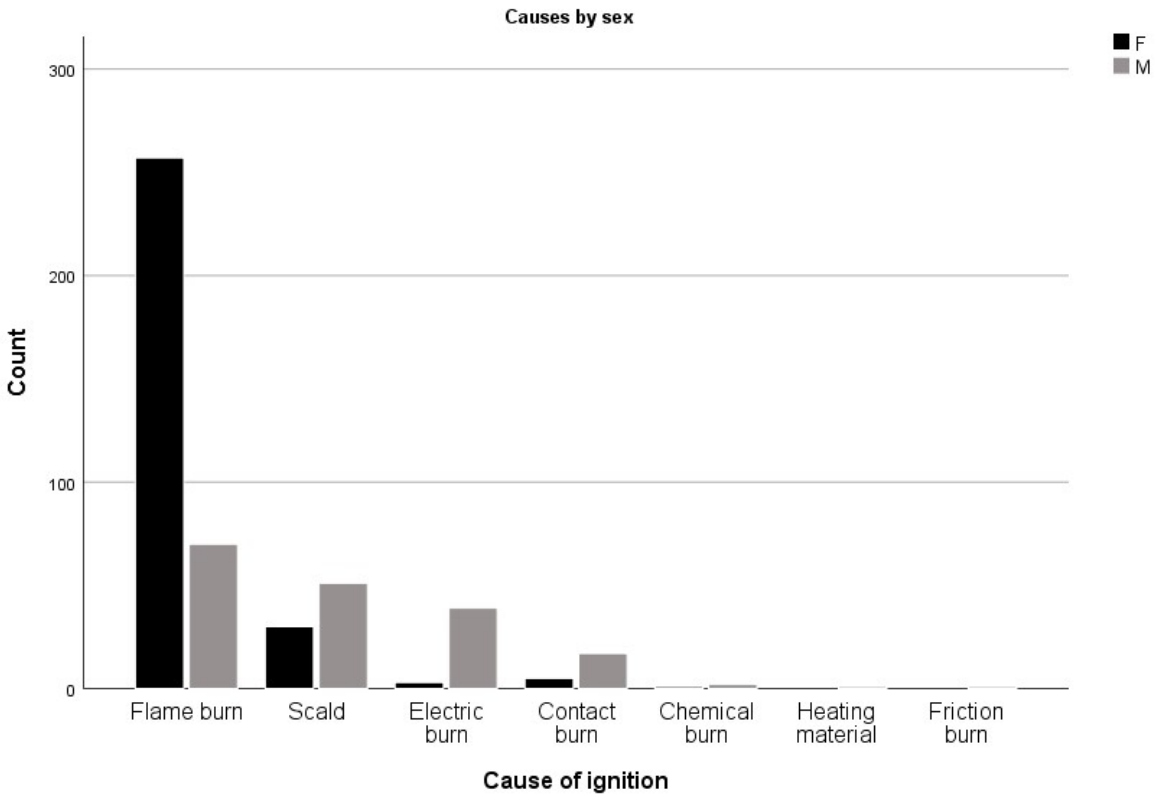

Figure 3. Distribution of burn patients by sex causes of ignition (N=530)

Place of burns

Close to 90% of burns occurred in home environment (n=530), of which 377 cases were occurred home indoor (including dining, living and washing rooms) and 100 cases in kitchen. At around 10% burns (n=14) were occurred in work environment such as boiler industry, rice mills and workshop.

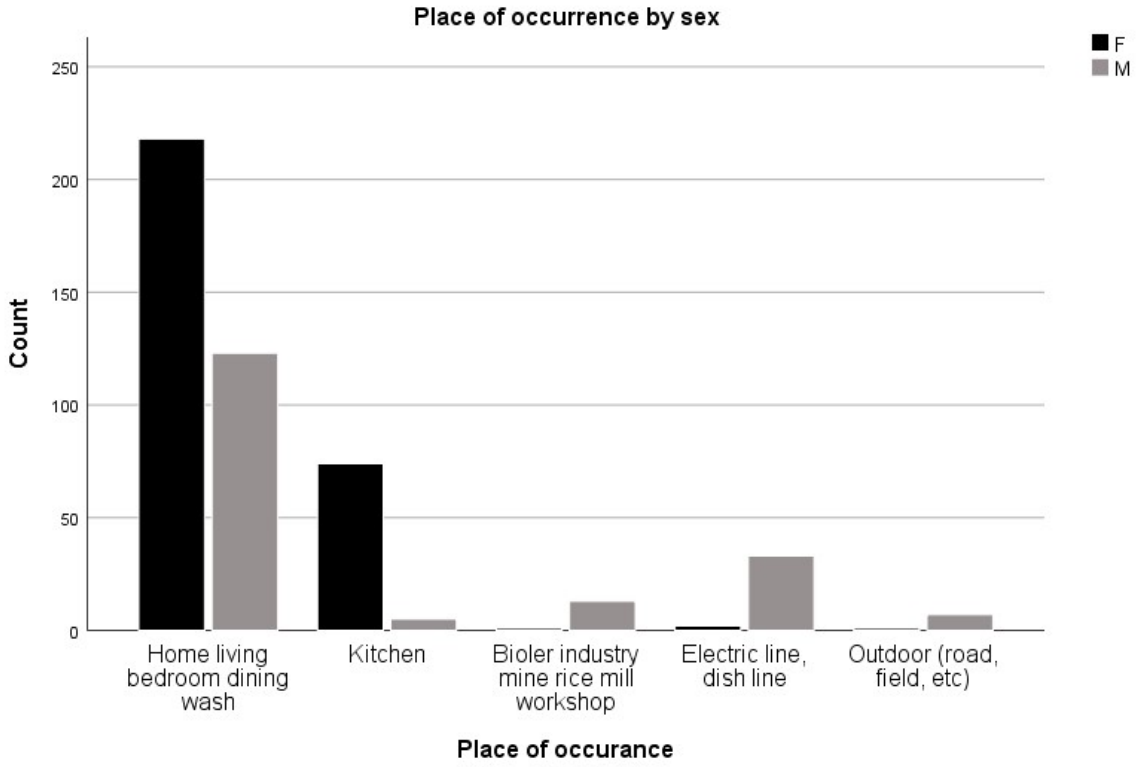

Figure 4. Distribution of burn patients by place of occurrence (N=530).

Occupation of burn victims

Majority of patients were housewife (43.2%) followed by student 21.8%, children (not working group) were 14.7%, worker 10.9%, farmer 6.5%, teacher 1.9%, businessman 0.2% & others 0.8%.

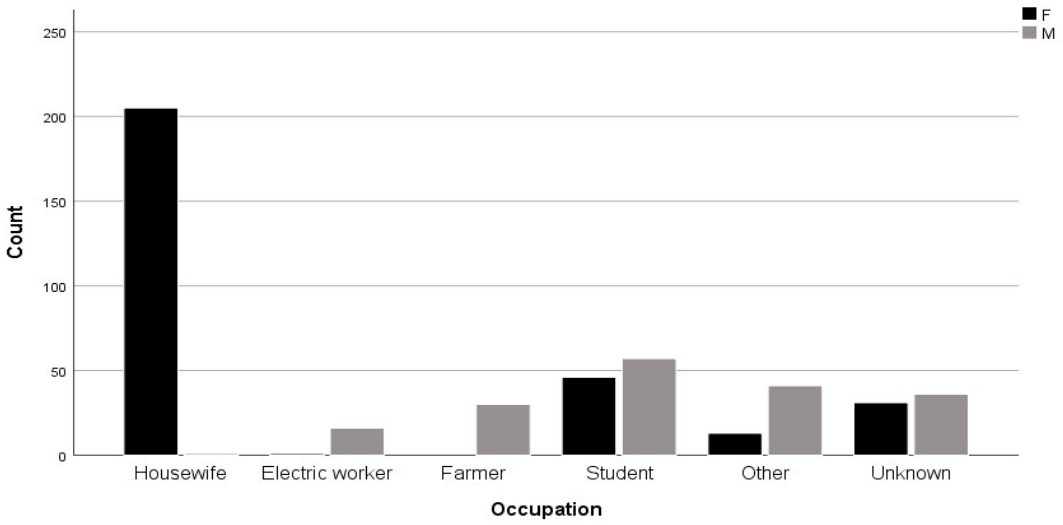

Figure 5. Distribution of fire burn patients by occupation (n=530).

Burns by seasonal variability

In a single month January, at around 34% of burns occurred during the study year, correspondence to 153 cases. Then March and June were 9.9 and 8% cases, respectively. The lowest cases were observed in August and September by approximately 2%.

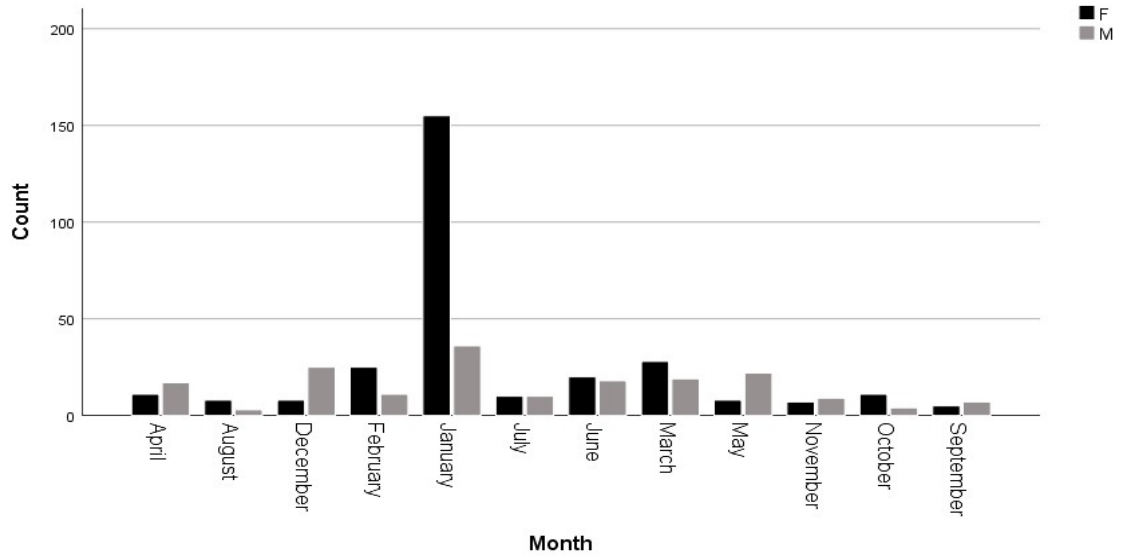

Figure 8. Distribution of seasonal variation (N=530)

Patient status

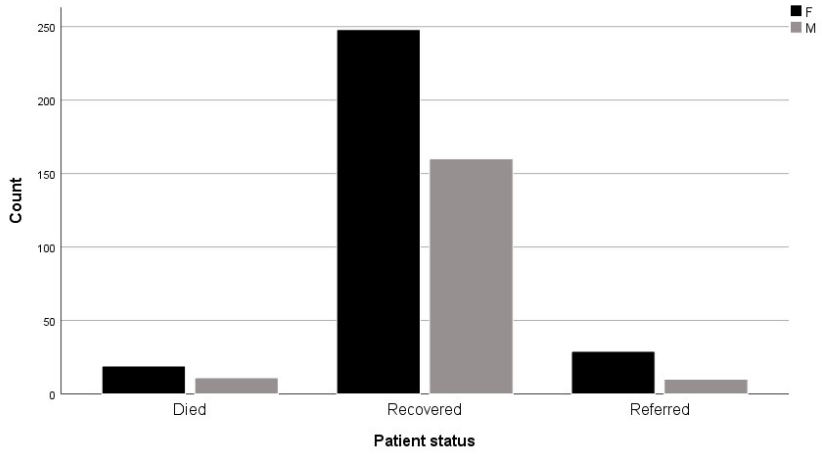

Figure 9. Distribution of burn patient status (N=530)

The patients died in this series which yielded a mortality rate of 7.5%. There were 34 death cases, of which 20 females and 14 females, with a female to male ratio of 1.42:1.Median age for this mortality group was 32.1 years-old. All patients who died were burn from TBSA 25% and above with most cases (30%) were TBSA 40-60%.

Discussion

The current epidemiological paper has analyzed hospitalized burn cases. Epidemiological studies of this type can be valuable for identifying patterns of injury, therefore, are useful for planning prevention strategies. A total number of 530 burn cases were registered to the burn care unit of Rangpur medical college hospital in Bangladesh between January 2023 and December 2023. The current data showed a two-dimensional model dominated by young and elderly adults aged 15 to 44 years and female sex. The findings of the current study are in the line with the previous studies on burns in India and in other low-income countries [4,5].Flame and fire burns were predominant burn type accounted for close to 70% (327) cases followed by scalds 17% and electric burn 9%. The predominance of burns among female extents to 3.7:1 when analyzing flame burns. It was similar to a household survey study in Bangladesh that also have predominance of flame burns[5]. In other study, the modes of flame burns were identified when refilling fuel in stove or cooking[6]. In contrast, males were somewhat overrepresented over females in other studies conducted in the region, in Afghanistan.[7] However, studies conducted in Taiwan and Hong Kong showed predominance of scalds and male involvement in burns[8,9].

Whether or not females were overrepresented in burn injury studies in South Asian countries, it is young and elderly females who are predominant in the region[10,11] For the unintentional flame and fire injuries, higher fire related injuries among females in the region were related to their roles in their households and the socioeconomic status they are belong to.[12] As in most occasions women are involved in kitchen activities and most of the fire and flame-related injuries occur in kitchen environment in this study and more than 50% fire and flame injuries in other studies,[13] this link indicates a clear association between female exposure to fires in kitchen environment and burn injuries. Furthermore, at their young age, women tend to involve in household cooking when they get married and eventually are exposed to fire hazards. This sudden change in their roles in household activities at early age and their inexperience in such activities may lead to higher fire injuries. It was reported in a study in Central India that married women were predominant involvement (80%) in fire injury deaths than unmarried women.[14] Wearing loose clothing, floor level cook and mishandling of kerosene stove were identified as risk factors for higher fire and flame injuries among women.[15]

Home environment like kitchen, dining, living room or bath room where use of hot liquid (such as hot water 61.6%, hot curry 24.7%,hot oil 8.6% others 4.0%) were more often responsible for scalding. Infant and children were the most sufferer of burn in this manner.[16]These were often associated with careless caring of hot liquid, unawareness of parents and lack of safety measures.

Electric burn was 8.6% in this study. Electrical occupation injuries in adult aged 21-40 years were mostly affected which often due to ignorance about gloves in hands, unaware of use insulated shoes and lack of safety measures. Touching or stepping on loose electrical wires was the most commonin others reports.[17]Increasing haphazard use of electricity in household and ignorance about its safety might responsible for some injuries particularly among young and children.

Winter was the most frequent season for burn injuries which is consisted with a household survey study in Bangladesh and other studies in Asian countries.Summer and spring, however, were found most common seasons when burn injury occur most frequently. On a monthbymonth basis, January was the highest month for recorded burn injuries which was due

to people got warm from fire to get relief from cold by fire camp. Camp fire related burn in northern Bangladesh become a major concern and become media reported issues each year in December and January. Combined with higher poverty and cold temperature than any other regions in Bangladesh make people vulnerable to flame injuries in the region. Specific etiology or contributing factor of burns showed that most injures due to fire camp in winter season to get heat from fire were 42.6%. Six studies identified the winter season as the most frequent time of year when majority of burn injury occurred.[18]

It was also found that cooking fire (16.1%) with wood was the 2nd major source of flame. Other studies, also declared that cooking was the one of major contributing factor for flame burns and some of them claimed kerosene lump or stove explosions were the factors. Kerosene involvement was only 0.4 %in this study.[19]

Thirty patient died in this series which yielded a mortality rate of 7.4% with female to male ratioof 1.42:1. Median age for this mortality group was 32.1 years old. Most patient died9(30%) cases were TBSA 46-60% followed by 16-30%. reported mortality rate 3.2%while other study reported mortality rate 40.02%. Depth of burn and percentage of TBSA are important factors determining the mortality rate after burn trauma.12 Most studies14 indicatedthat female mortality was more than male while another studyshowed male mortality was more.[19]

.

Limitations

Homicide and suicide cases were not included due to medico-legal reasons. Fates of referred cases could not be elicited

Conclusions

This study was indicated the Socio-demographic features, factor associated with burn injuries and their outcome. Most of the injuries had occurred at home revealing that women and children were the most vulnerable group. Most of the time lack of safety measures is an important cause for burn. Present hospital setting provides a good opportunity for burn prevention because families of burn patients visit the hospital for several times until their patients are cured, during which time safety education can be provided by electronic board of burn unit. Accurate information about this issue must be conveyed to the population through mass media and other appropriate communication channels. Public awareness through different communication channels and education through school could be provided about burn related safety practices. Burn surveillance could probably be one of the priorities regarding burn prevention.

Acknowledgments

The authors would like to acknowledge the ethical committee of Rangpur Medical College, Director of the hospital and burn unit for their cooperation. We are also grateful to the patients and their relatives who willingly participated in the registration process.

References

1. Ahmad, M., Hussain, S. S., Khan, M. I., & Malik, S. (2007). Experience of burn injuries at the Pakistan institute of medical science, Islamabad, Pakistan. *Annals of burns and fire Disasters, 20*(1), 7
2. Ambade, V. N., & Godbole, H. V. (2006). Study of burn deaths in Nagpur, Central India. *Burns, 32*(7), 902-908.
3. Atiyeh, B. S., Costagliola, M., & Hayek, S. N. (2009). Burn prevention mechanisms and outcomes: pitfalls, failures and successes. *Burns, 35*(2), 181-193.
4. Burd, A., & Yuen, C. (2005). A global study of hospitalized paediatric burn patients. *Burns, 31*(4), 432-438.
5. Calder, F. (2002). Four years of burn injuries in a Red Cross hospital in Afghanistan. *Burns, 28*(6), 563-568.

6. 6.Chien, W.-C., Pai, L., Lin, C.-C., & Chen, H.-C. (2003). Epidemiology of hospitalized burns patients in Taiwan. *Burns, 29*(6), 582-588..
7. Dissanaike, S., & Rahimi, M. (2009). Epidemiology of burn injuries: highlighting cultural and socio-demographic aspects. *International review of psychiatry, 21*(6), 505-511.
8. Ganesamoni, S., Kate, V., & Sadasivan, J. (2010). Epidemiology of hospitalized burn patients in a tertiary care hospital in South India. *Burns, 36*(3), 422-429.
9. Golshan, A., Patel, C., & Hyder, A. A. (2013). A systematic review of the epidemiology of unintentional burn injuries in South Asia. *Journal of Public Health, 35*(3), 384-396
10. He, S., Alonge, O., Agrawal, P., Sharmin, S., Islam, I., Mashreky, S., & Arifeen, S. (2017). Epidemiology of burns in rural Bangladesh: An update. International journal of environmental research and public health, 14(4), 381.
11. Ho, W.-s., & Ying, S. (2001). An epidemiological study of 1063 hospitalized burn patients in a tertiary burns centre in Hong Kong. *Burns, 27*(2), 119-123
12. Iqbal, T., Saaiq, M., & Ali, Z. (2013). Epidemiology and outcome of burns: Early experience at the country's first national burns Centre. *Burns, 39*(2), 358-362.
13. Kumar, V., & Tripathi, C. B. (2003). Fatal accidental burns in married women. *Legal Medicine, 5*(3), 139-145.
14. Laloe, V. (2002). Epidemiology and mortality of burns in a general hospital of Eastern Sri Lanka. *Burns, 28*(8), 778-781.
15. Marsh, D., Sheikh, A., Khalil, A., Kamil, S., Qureshi, I., Siraj, Y., . . . Effendi, S. (1996). Epidemiology of adults hospitalized with burns in Karachi, Pakistan. *Burns, 22*(3), 225-229.
16. Sanghavi, P., Bhalla, K., & Das, V. (2009). Fire-related deaths in India in 2001: a retrospective analysis of data. *The Lancet, 373*(9671), 1282-1288.
17. Peck, M. D. (2011). Epidemiology of burns throughout the world. Part I: Distribution and risk factors. *Burns, 37*(7), 1087-1100.
18. Ahuja, R. B., Bhattacharya, S., & Rai, A. (2009). Changing trends of an endemic trauma. *Burns, 35*(5), 650-656