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Demographic and Clinical Profiles of Burn Fatalities in Bangladesh: A Morgue Based Study of 405 Autopsies

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ABSTRACT

Introduction: Deaths due to burn are an important public health related issue in a developing country like Bangladesh.Burn injuries have been described as the most serious injuries that may afflict a human being. It is a considerable one of the commonest cause of unnatural deaths in Bangladesh. Females, child, rural dwellers and populations of low socioeconomic condition are mostly suffered by burn injuries. The purpose of thisretrospective study was to record and evaluate the actual and potential causes and the magnitude of the fatal burn injuries.

Materials and methods: This retrospective cross-sectional study was conducted among the burn death victims at Dhaka Medical College, Morgue, during the period of January 2023-December 2023

Results: An analysis of autopsy records revealed 405 (11.27%) cases of burn injuries among the total 3589 autopsies done over 1 year period (January 2023-December 2023) in the mortuary of Dhaka Medical College. Among the total burn cases the flame burns were seen in 76.79% of the victims, out of these fire was the commonest cause (71.71%). The majority of deaths (21.89%) occurred between 31 and 40 years of age group with a preponderance of males (66.73%) female maleratio being 1:2. Most of the victims died from neurogenic shock (54.73%) followed by septicemia (23.59%). The majority of deaths occurred within a week (80.82%) and the percentages of burns (TBSA) over 50% were observed in most of the cases (83.27%). Accidental death was the most common manner of burn death accounting for 331 (81.65%)and the commonest location for burn deaths was home locations 259 (63.89%). Highest incidence of burn occurred in winter 170 (42.03%) regarding variations in burn injury with time of day, the incidence is high in night 219 (54.07%) day night ratio being 1:1.18.

Conclusion: The results of this study provide the necessary information's to address it as a public health relatedproblem and develop proper burn prevention programs, thus reducing the frequency of burns and burn-related deaths.

KEY WORDS

Burn deaths; Flame burns; Neurogenic shock; Septicemia; TBSA.

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INTRODUCTION

Most thermal injuries occur from structure fires. The most important question to answer is if the decedent was alive or dead during the fire. The answer to this question enables the investigator to distinguish between homicide and other manners of death and it provides a challenging problem in the distinction between ante-mortem and post-mortem burn, which may have serious criminal aspects.[1] Burn injury is a common type of traumatic injury, causing considerable morbidity and mortality.[2] Moreover, burns are the most expensive traumatic injuries, because of prolong hospitalization and rehabilitation and costly wound and scar treatment.[3, 4]

Burns are dry heat injuries produced by application of dry heat such as flame, radiant heat or some heated solid substance like metal or glass to the body. Burn is restricted to the local effects of dry heat. Moist heat leading to scalds and corrosive poisons resulting in corrosive burns. Electric spark, discharges, flashes and lightening leads to electric burns. Burn due to Xray and Ultraviolet rayare also classified as a burn for medicolegal purposes.[5]

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For management of burn injuries patients are stay long in all the hospitals for better treatment.[6] According to the World Health Organization, 1,80,000 individuals died of fire-related burns in 2023,Non fatal burn injuries are a leading cause of morbidity, burns occur mainly in the home and workplace and 95% of these deaths occurred in low and middle-income countries. In many high income countries, burn death gradually decreasing but the rate of child death due to burn 7 times higher in low and middle income countries.[7,8] The approach to burn prevention, depends on the sound knowledge of etiological patterns of burn injuries.[9]

In Bangladesh burn considered as major health problems that are associated with high mortality and morbidity. Dhaka, the capital of Bangladesh, is one of the most crowded cities in the world. The population of Greater Dhaka, according to the most recently published statistics is 23.210 million inhabitants.[10]

Our aim of this study was to record and evaluate the causes and the magnitude of the fatal burn injuries retrospectively.

MATERIALS AND METHODS

This retrospective cross sectional study was conducted among burn death victims at the Dhaka Medical College (DMC) Morgue during the period of January 2023-December 2023. Of the 3589 autopsies performed on all types of unnatural deaths between above period, 405 (11.27%) were the cases of burns. These 405 fatal burn cases form the material of this study. Various identification data of the study subjects were noted from the inquest report accompanying the dead bodies, information from the victim's attendants and 3rd copy of post mortem reports preserved in the Forensic Medicine Department of Dhaka Medical College. From ethical points of view necessary consent of doctors who performed the autopsies and relatives of victims have been taken. The data collection technique and approval was taken from Dhaka Medical College ethical clearance committee.

RESULTS

A total of 3589 cases of unnatural deaths were autopsied in DMC Morgue, number of deaths by burn were 405 (11.27%). Among the total burn cases flame burn was the commonest cause 311 (76.79%), out of thesefire was the commonest cause 290 (71.71%) followed by electric burn 78 (19.3%) (Table I).

Table I Distribution of causative agents of burning (n=405)

Causative agents	No. of victim	Percentage
Fire	290	71.71%
Pouring of kerosene	21	5.08%
Electric burn	78	19.3%
Scald	00	00%
Chemical burn	16	3.91%
Total	405	100%

Among the burn deaths, 270 (66.73%) out of 405 were male and 135 (33.27%) were females with female male ratio being 1:2 (Table II).

Table II Sex distribution of burn victims (n=405)

Sex	No. of victim	Percentage	Ratio
Male	270	66.73%	Female : male
Female	135	33.27%	1 : 2
Total	405	100%	

Highest incidence of burn was found in 31-40 years age group 96 (22.02%) (Figure-1) followed by 21-30 age group of 92 (21.1%).

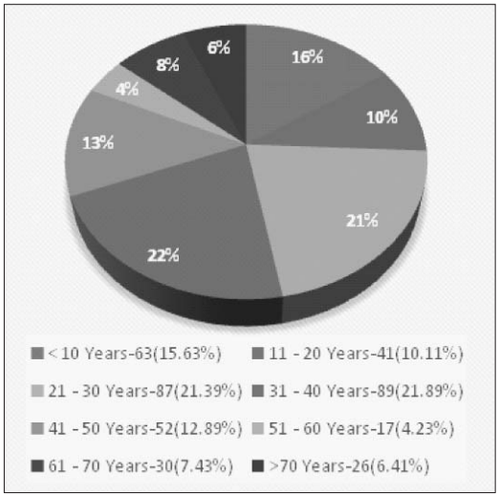

Figure 1 Age distribution of burn victims (n=405)

The study shows that majority of burn victims were died due to neurogenic shock 222 (54.73%) (Table III) followed by septicemia 96 (23.59%).

Table III Cause of death in burns (n=405)

Cause of death	No. of victim	Percentage
Neurogenic shock	222	54.73%
Septicaemia	96	23.59%
Hypovolemic shock	48	11.83%
Asphyxia	24	5.89%
Multi organ failure	15	3.96%
Total	405	100%

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The majority of deaths (80.82%) due to burns occurred within a week of the incident. During this period the maximum number of deaths were 259(63.89%), occurred within 6 hours. 56 (13.89%) deaths occurred within 1-2 weeks post-injury period as shown in Figure 2.

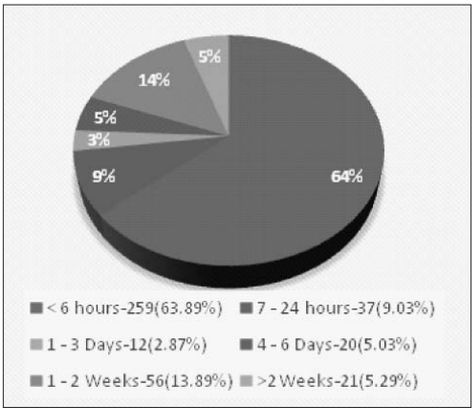

Figure 2 Duration of survive of the victim (n=405)

It was observed thatthe percentages of burns (TBSA) over 50% were in most of the cases (83.27%) and maximum number of victims 162(39.89%) weresustained 50-70% of total body surface area (TBSA) burns (Figure 3) &(Table- 4) followed by 101(24.93%) victims sustained 71-90% total body surface area (TBSA) burns.

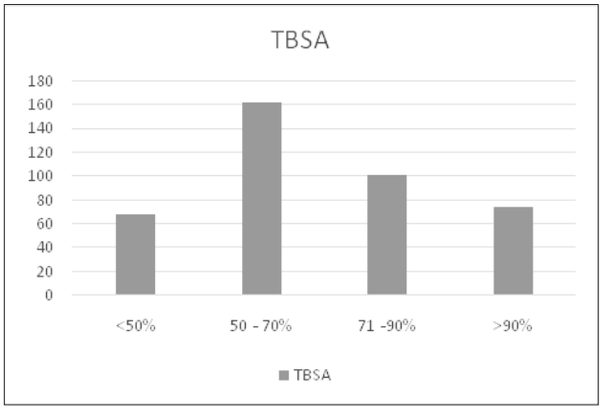

Figure 3 The median burn percent (TBSA) (n=405)

Table IV Distribution of total body surface area (TBSA) (n=405)

TBSA	No. of victim	Percentage
<50%	68	16.73%
50 – 70%	162	39.89%
71 – 90%	101	24.93%
>90%	74	18.45%
Total	405	100%

Accidental death was the most common manner of burn death accounting for 331 (81.63%) (Table V) followed by suicidal death were 53 (13.17%).

Table V Manner distribution of burn victims (n=405)

Manner	No. of victim	Percentage
Accidental	331	81.63%
Suicidal	53	13.17%
Homicidal	21	5.20%
Total	405	100%

Table VI shows the commonest location for burn deaths was home locations 259 (63.89%), followed by work locations 110 (27.13%) and a small percentage in outdoor locations 36 (8.98%).

Table VI Burn victims in relation to location (n=405)

Manner	No. of victim	Percentage
Home	259	63.89%
Work place	110	27.13%
Outdoor	36	8.98%
Total	405	100%

Highest incidence of burn occurred in winter 170 (42.03%) (Table VII) followed by summer 99 (24.41%).

Table VII Seasonal variation of burn deaths. (n=405)

Season	No. of victim	Percentage
Autumn	71	17.59%
Winter	170	42.03%
Spring	65	15.97%
Summer	99	24.41%
Total	405	100%

Regarding variations in burn injury with time of day, the incidence is high in night 235(53.9%) more than day 201(46.1%) with day night ratio being 1: 1.18 (Table VIII).

Table VIII Diurnal variation of burn deaths. (n=405)

Time of Day	No. of victim	Percentage	Ratio
Day	186	45.93%	Day : Night
Night	219	54.07%	1 : 1.18
Total	405	100%	

DISCUSSION

Burn is a problem prevalent worldwide, especially in developing countries.[11,12] Depends upon the available information's regarding the incidence of burns and burn deaths, this should be considered as a significant problem in Bangladesh. As many as 27,624 fire incidents across the country in 2023 according to Bangladesh Fire service and civil defense headquarters. At least 77 fire incidents were recorded in a day on average. Of the incidents, 3, 334 fire accidents occurred in March, 3, 141 in April, 3, 235 in May, 2, 646 in

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January, 2, 713 in February and 2450 in June. In the present study, flame is the major cause of burns (96.09%) which is consistent with the study from Manipal.[13] The higher incidence of burn deaths among males (66.73%) was observed and the sex ratio being almost two times higher in male throughout the study period, while in Sri Lanka burn cases were observed to be more common among males in all age groups except in the elderly.[12] Contrarily in India burn is the only unnatural cause in which female not only outnumbered the males, but the sex ratio being almost three times higher in female.[14] In the present study, about 66.28% of the victims were in the age group of 11–50 years with peak incidence between 21 - 40 years (43.28%), which are similar to the observation of Singh et al. from Chandigarh who reported two thirds of fatal burn cases in the young age group (21–40 years).[15] In other countries such as Iran 93% of burn victims were below 60 years with peak incidence between 16 and 25 years.[16] Respiratory complications (Pneumonia, ARDS, pulmonary embolism) are major cause of death responsible for up to 34% among adults, and even up to 45% among the elderly.[17,18] In the present study, the major cause of death was neurogenic shock in 54.73% cases, followed by Septicemia-(23.59%) while septicemia was the leading cause of death as reported by Rahul et al. and Stefan.[19, 20] Other causes were hypovolemic shock, asphyxia, multi organ failure, etc. as also mentioned in the result.In the current study, 72.92% cases died within a few minutes to 24 h, 7.90% cases within a week, signifying that the burns are rapidly fatal. Similarly Virendra et al. also reported death from burns within a week in 60.8% victims.[13] In the present series, the overwhelming majority (83.27%) of the victims had more than 50% of Total Body Surface Area (TBSA) burns indicating the incompatibility with life even at a tertiary care center. Similarly 80% mortality rate in burns over 40–50% TBSA has been reported from India.[13] Though the majority of the incidents are accidental in nature (81.65%) suicidal (13.17%) and homicidal (5.20%) cases were also observed. As noted with other studies, accidental burning was the commonest manner of deaths due to burning followed by suicidal and homicidal burning.[21,22] Regarding accident location, our study showed that the home ranked first (63.89%) followed by workplace (27.13%) then outdoor locations (8.98%). This comes in accordance with the findings of other reporter[23].Seasonal variations in our study showed that burn deaths occurred mostly in winter (42.03%) followed by summer (24.41%). This might be due to the fact that, in winter, there is more need for hot water for drinking and bathing. The traditional kerosene stove, which is extensively used in the slum areas for cooking and providing the necessary boiling water for bathing, lacks any safety measures. Thus, flame burns and scald burns are more common in our country. This fact has been previously highlighted by the study from other low income country and diurnal variation in our study showed that burn deaths occurred mostly at night (54.07%) and day night ratio being close almost (1:1.18) in which reports from developed countries had attributed winter peaks in hospital admissions to the greater use of heating during colder and longer nights.[24,25]

CONCLUSION

Burns have always been considered as one of the most destructive injuries, causing not only death but also major economic and psychological impacts and long term somatic sequelaeto the burn victims.The present autopsy-based study has highlighted some important features pertaining to burn deaths in Bangladesh which provide the necessary information's to address it as a public health related problems and develop proper burn prevention programs, thereby reducing the frequency of burns and burn-related deaths. The most important step in reducing the burn incidence is through mass education.

RECOMMENDATION

Steps should be taken for improvement of public awareness by the concern authority, training of communities in first aid, modernized life saving equipments and proper implementation of law. Developed countries lowering the rates of burn deaths, through a combined action of preventive strategies and improvement in the treatment pattern of burn affected people.

DISCLOSURE

All the authors declared no competing interest.

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