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RESEARCH ARTICLE

Changing concept in Burns Management- An Analytical study of Epidemiology, Morbidity, Mortality and Treatment in a period of forty years in the Indian state of Assam

Bhupendra Prasad Sarma

Senior Consultant Surgeon (Burns). NEMCARE Hospital, Bhangagarh, G S Road. Guwahati- 781005, Assam, India.

*bpsarmadr@gmail.com

ABSTRACT

There is an improvement in the morbidity and mortality in burns in the recent past due to better fluid resuscitation, use of better burn wound covers and early excision and skin grafting for full thickness burns. Burn care in the North Eastern Indian state of Assam was disorganized in the eighties, but individual efforts by some surgeons of the state, have improved outcome. This is a retrospective analysis of 8569 cases of burn injuries treated in three hospitals of Assam over a period of 40 years. The study intends to analyze the epidemiological pattern of burn injuries in order to plan preventive strategies and also to compare the results of treatment with and without an organized burn care unit. There were 7071 (82.3%) minor burns and 1518(17.7%) major burns in the series. The period of study was divided into three blocks - Block I- first 14 years of disorganized management, before establishment of Burns Unit, Block II -next 16 years of organized management after establishment of Burns Unit and Block III - last 10 years of advanced care with introduction of newer burn wound covers and early excision of burns. The data were analyzed and compared.

The overall incidence of burns was more in males, but a greater number of females were the victims of major burns.77.2% of patients were below 40 years of age. The number of accidental burns remaining constant in the three blocks, there was a significant increase in the suicidal burns in the last two blocks. Flame burns (56.7%) constituted the majority of injuries, while scald (31.3%) and electrical burns (9.3%) followed. Domestic burns (73.1%) were of most common occurrence, followed by Industrial (10.8%), Diwali related (9.6%) and Traffic burns (6.4%).

Though the overall mortality in the three blocks were almost same (Block I- 9.4%, Block II- 7.8% Block III-9.4%), mortality in major burns were reduced significantly after introduction of modern methods of management (Block I- 79.7%, Block II-52.0% Block III-38.4%). The quality of wound healing showed improvement in the subsequent years as evident by increase in number of patients with no scar (Block I -10%. Block II-20%, Block III- 37%) and decrease in number of patients with extensive scar (Block I-18%, Block II- 15%, Block III-5%), measured by Vancouver Scar Scale.

This analytical study has given us an understanding of the magnitude of the problem of burns in the region, which will help to plan treatment and preventive strategies. It also concludes that, dedicated individual care and introduction of newer methods of treatment have improved results of burn management.

Key words- Epidemiology, treatment, morbidity and mortality

Introduction

Severe burn is a major public health issue in developing nations. Inadequate infrastructures, paucity of resources, lack of trained manpower, lack of information, poor personal hygiene are some of the causes of high mortality and morbidity in burns. The burden of suffering from fire is mostly distributed amongst the poorer section of the society. Low roof, overcrowded houses, floor level cooking with open flame, poor safety standards are causes of high incidence of fire accidents amongst them. A large number of burns are related to the nature of domestic appliances that are used for cooking, heating, lighting [1]. It is a cause of concern to see the enormity and the far-reaching consequences of physical disfigurement amongst the burn survivors. Lack of facilities for adequate management of burns leads to crippling physical deformities even in minor burns. Statistics revealed that, majority (90%) of fire-related fatalities occur in low and middle-income countries (LMICs), mostly in the South-East Asian countries. where burn deaths and injuries are more common among the poorest populations.

According to the data published by National Health portal of India (Last updated in 2016) ([increased mortality and morbidity in the low- and medium-income countries of the world. As per website of National Academy of Burns India \(NABI\) \(<http://www.thenabi.org>\) there are total 67 burn care centers in the country. Out of total 1339 beds for burn care, 297 are ICU beds. So, it is obvious that there is a wide gap between the number of patients sustaining burns every year \(7 million\) and requiring treatment \(0.7 million\) and the number of beds available for treatment \(1339\). However, better understanding of the fluid resuscitation, introduction of improved burn wound covers and early excision and skin grafting for full thickness burns in the established burn care centers of the country, have led to reduced mortality and morbidity of the burn patients.](https://www.nhp.gov.in/disease/skin/burns#:~:text=7 million people suffer from burn injuries every year with 1.4 lakhs (0.14 million) death and 2.4 lakhs (0.24 million) suffering from various disabilities. In 1998, India was the only country in the world where fire (burns) was classified among the 15 leading causes of death. High mortality in young married women from burns has already become an alarming and contentious medical problem in rural India. Increased exposure of the young, married women to open flame in the kitchen and other household activities is responsible for increased incidence of serious burn injuries amongst them. Jayaraman et al reported that 67% of the total patient, died in their study, was young females. The most common modes of burning are flames, followed by scalds; a small percentage of victims suffer from chemical and electrical burns [2]. While household accidents, mostly occurring in the kitchens account for majority of the burn injuries, industrial accidents, terrorist violence, major road, rail and air accidents are also contributing to a sizeable number of burn injuries in recent times. Non-fatal burns are a leading cause of morbidity, including prolonged hospitalization, disfigurement and disability, often with resulting stigma and rejection. Absence of organized care to the majority of the burn victims is the cause of</p></div><div data-bbox=)

The facilities for burn care in the North-Eastern region of India, consisting of seven states, were primitive in the early eighties. The treatment received by burn victims were delayed, inadequate and mostly inappropriate. Lack of proper infrastructure and trained manpower in the Government health set-up and reluctance of private health facilities to treat burn injured patients, led to increased mortality and morbidity in burns. The situation improved in mid-nineties with the establishment of a burn unit and introduction changing concept of management of the burn injured patients in Assam, one of the states of the North-Eastern India. Further improvement in management of burns were noted in the last two decades with increase in number of burn units, both in private and government health facilities in the region.

The objective of the present study is to look into the changing pattern of epidemiology of burn injuries amongst the patients, treated by the author, over a period of forty years and also to compare the results of treatment of burns before and after the establishment of organized burn care in the North Eastern state of Assam.

Materials and methods

This retrospective study was done in a period of 40 years from 1980 to 2020 in two different demographic locations and three hospitals of Assam. The data were collected from the admission records, case sheets, the OPD record books and computerized database (in the later period) of the hospitals. The first 25 years of study was conducted in Indian Oil Corporation Limited (Assam Oil Division) – IOCL (AOD) Hospital, at Digboi, a peripheral industrial town of Assam. This 200 bedded industrial hospital treated patients

from a large area of upper Assam and part of another adjacent state- Arunachal Pradesh. Burn injured patients were treated in an isolated room or at the corner of the general surgical ward till 1994. A three bedded burn unit was established in the hospital in May 1994 and organized burn care started thereafter. Changing protocol of burns management, rehabilitation of burn victims, clinical research works and burn prevention programs were the new introductions after the establishment of the burn unit. The records of the patients - both indoor and OPD, treated in this hospital, could be retrieved from the case sheets, indoor registers and OPD records. The next 5 year's study was conducted in Guwahati Refinery Hospital, an industrial hospital located at Guwahati, the capital city of Assam. Though, there was no burn unit in this hospital, burn care was organized with modern protocols in isolated rooms, using limited modern gadgets. The last 10 years of the study was done in the burn unit of NEMCARE Hospital, Guwahati. This was a 10 bedded tertiary care burn unit with facility for advanced critical care. From 1994 onwards, computerized records of the burn patients were available for the study.

Depending upon the availability of logistics, technical and human resources and advancement in management, the period of study was divided into three blocks- Block I- 1980-1993- Period of disorganized management (before establishment of burn unit), Block II- 1994 to 2010 – Period of organized management (after establishment of burn unit), Block III- 2011-2020- Period of advanced management of burns.

In Block I, there was no burn unit in the IOCL (AOD) Hospital. Patients were treated in a general ward or in isolated room, without any specified antiseptic protocol. Fluid resuscitation was done by Evan's formula – using both crystalloids and colloids. No specific diet regimen was given to the patients. A large number of burn wounds were treated by exposure method—cleaned wounds were smeared with povidone iodine ointment and a blanket was put over a cradle to avoid contact of clothes with the wound. Closed dressing with povidone iodine ointment and Vaseline gauze was done in some other cases. Skin grafting was done after 3-4 weeks (over granulating wounds) in selected cases. No pressure therapy or splinting was used. There was no trained manpower in this period. Scar grading was done by visual and clinical impressions only.

In Block II, A three bedded burn unit was established in IOCL (AOD) hospital in 1994. Doctors,

nurses and paramedics were trained in a tertiary burn care center outside the state. The protocol of management of burns was changed. Fluid resuscitation was done by using Parkland formula and better monitoring of fluids was ensured with measurement of hourly urinary output and use of CVP line in deserving cases. An antibiotic protocol was employed and a specific diet regimen was introduced for nutritional management. Exposure method of treatment of burn wound was totally discontinued. Closed dressings were done daily with 1% Silver Sulphadiazine cream and the wounds were covered with boiled potato peel bandages in the early periods. In the later period of the Block, 1% Silver Sulphadiazine with Vaseline gauze was used in closed dressings. New burn wound cover- Dry Collagen sheets were used in some selected cases. Delayed skin grafting was done in most of the cases. Early Excision and Skin Grafting was done in a few cases, in last five years of this block. Pressure therapy with crepe bandage was regularly used after the wounds healed. Pressure garments were also used in selected patients. Patients developing scars were followed up and treated. Scars were measured and graded by using Vancouver Scar Scale (VSS) in the follow up period and records were computerized. A VSS score of 1-4 was graded as mild, 5-9 as moderate and 10-13 as extensive.

In Block III, advanced protocol of management was employed in the tertiary care burn unit. Modified Parkland formula was used for fluid resuscitation with hourly monitoring of intake and output. Improved nutritional supplement and use of strict antibiotic protocol (antibiotics were given according to culture and sensitivity reports only) were other hallmark of management. Newer burn wound covers like Collagen sheet, Silver Ion dressings and Nano-Crystalline Silver dressings were used in superficial dermal, deep dermal and full thickness burns respectively. This was done after proper clinical assessment of the depth of the wounds. Most of the full thickness burn cases (less than 50% TBSA burn), who were fit for operation and also agreed for the procedure, were subjected to Early Excision and Skin Grafting. Delayed skin grafting procedures were reserved for the patients, who presented late with infection. They were prepared for surgery with repeated closed dressings with Collagen based 1% Silver Sulphadiazine cream. Physiotherapy, massage and pressure garments were given to all patients for prevention of scars. The patients were regularly and systematically followed up. Scars, if

developed, were measured and graded as was done in Block II. Treatment of scars by injection of Triamcinolone Acetonide, Silicone Gel Sheet application, Scar Excision and reconstruction were done in deserving cases. Final scoring of such patients was recorded after the scar settled down following treatment.

The study was approved by the Hospital Ethical Committee.

Data analysis

Data was entered and analyzed in R Studio software version 1.4.1717 for windows. For difference in categorical variables, Pearson Chi

square (χ^2)-test was used. A value of $P < 0.05$ was considered statistically significant. For data analysis mean and SD were used as descriptive statistics.

Results

Out of the total 8569 cases of burn-injured patients, 2520 patients were treated as indoor and 6049 were treated as outpatients There were 7071 (82.3%) minor burns (<20%TBSA) and 1518(17.7%) major burns (>20% TBSA) in the series. The block wise total patients were 1672 in Block I, 3250 in Block II and 3647 in Block III (Table I).

Table I

	TOTAL NUMBER OF CASES			NO. OF MAJOR & MINOR BURNS	
	OPD	INDOOR	TOTAL	MINOR	MAJOR
1980-1993 (Block I)	1242	430	1672	1474	198
1994-2010 (Block II)	2430	820	3250	2764	486
2011-2020 (Block III)	2377	1270	3647	2813	834
Total- 1980- 2020	6049 70.5%	2520 29.4%	8569	7071 82.3%	1518 17.7%

Figures in the parentheses show row-wise percentages

Amongst the total patients, there were more males than females (male- 4548 and female - 4021); but when only the indoor patients were considered, (n-2520), females (1480) outnumbered the males (1040) (Fig I). Analysis of age incidence revealed that, 3372 (39.4%) patients were below 18 years, 3246 (37.8%) were between 19-40

years, 1348 (15.7%) were between 41-60 years and 603 (7.1%) were above 60 years of age (Table II). The mean age (MA) and standard deviations (SD) in each Blocks were- Block I- 26.66 years (MA) 15.18 (SD), Block II- 26.08 years (MA) 16.65(SD), and in Block III 29.90 years (MA) 21.07 (SD).

Table II
Age Incidence

Year	1-18 Yrs	19- 40 yrs	41-60 Yrs	Above 60 Yrs	Total
1980-1993 Block I	574 34.3%	810 48.4%	254 15.1%	34 2.0%	1672
1994-2010 Block II	1300 40.0%	1365 42.0%	455 14.0%	130 4.0%	3250
2011-2020 Block III	1498 41.0%	1071 29.3%	639 17.5%	439 12.0%	3647
Total	3372 39.4%	3246 37.8%	1348 15.7%	603 7.1%	8569

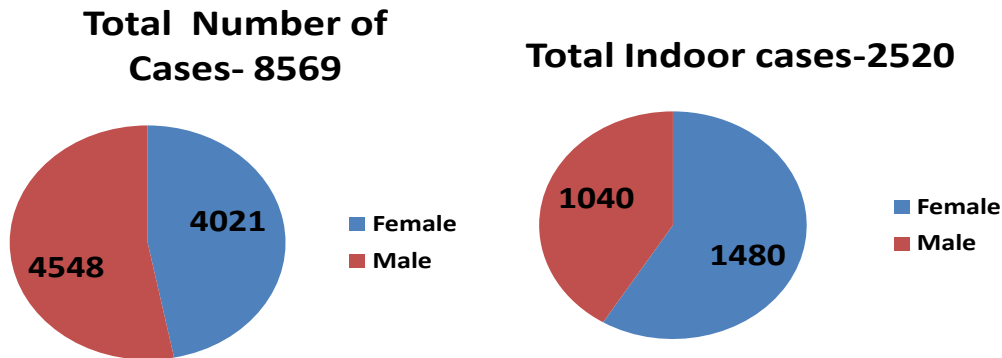
Figures in the parentheses show row-wise percentages

Block I- 26.66 Years (MA) 15.18 (SD), Block II- 26.08Years (MA) 16.65 (SD), and in Block III 29.90Years (MA) 21.07 (SD)

Analyzing the modes of burning, it was found that 91.9% cases (n-7883) were accidental burns, 5.9% (n-514) were suicidal and 2.0% (n-172) was homicidal burns. Further analyzing the mode of burning in the three blocks separately, it

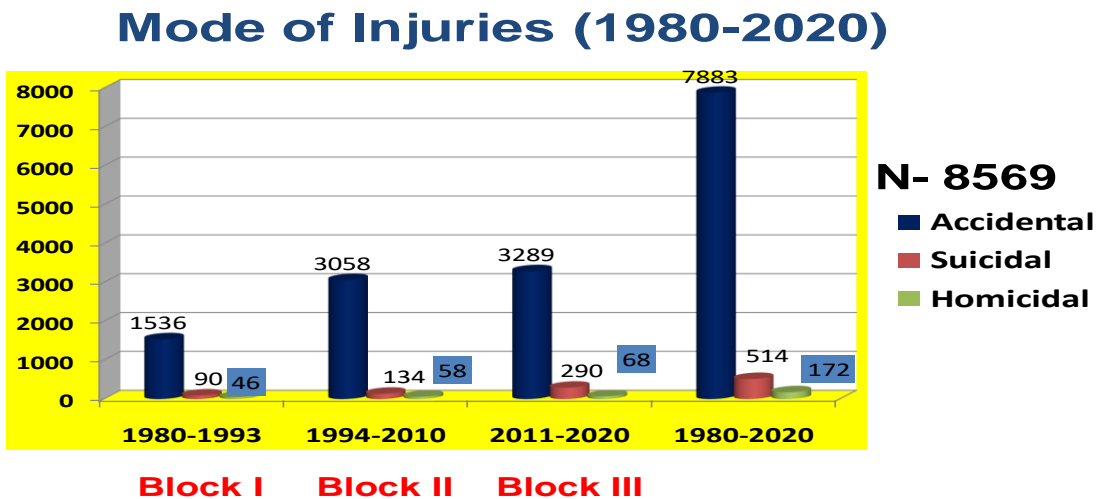
was evident that homicidal burns remaining almost at par in the three blocks, there was significant increase in accidental ($\chi^2 690.45 P < 0.001$) and in suicidal burns ($\chi^2 128.93 P < 0.001$) - 90 cases in Block I, 134 in Block II and 290 in Block III. (Fig I).

Fig I



Number and Gender of the patients

Fig II



Accidental- $\chi^2 = 690.45 P < 0.001$, Suicidal- $\chi^2 = 128.93 P < 0.001$, Homicidal - $\chi^2 = 4.23 P = 0.121$

The analysis of the causative factors of the burn injuries revealed that, there were 3153 numbers (56.7%) of flame burns, 1730 (31.3%) scalds, 519 (9.3%) electrical burns and 154(2.7%) chemical burns (Fig III). Most of the burn accidents were domestic burns (n- 4056 - 73.1%), followed by industrial burns (602- 10.8%), Diwali related burns (n- 537- 9.6%) and traffic burns (n- 361-

6.5%) (Fig IV). Further analysis of the domestic burns (excluding the suicidal and homicidal burns) (n=3787), revealed that, there were 1205(31.8%) burn accidents due to kitchen fire, 923 (24.3%) due to stove mishaps, 323 (8.5%) LPG related, 1050 (27.7%) from fire places outside the kitchen and 286 (7.5%) in other places of the house (Fig V).

Fig III

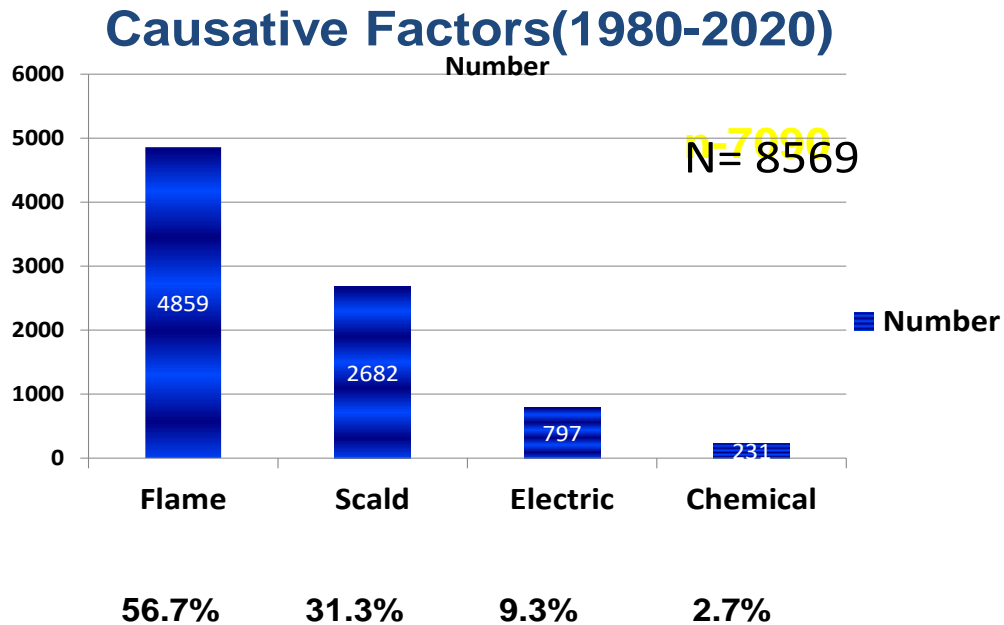


Fig IV

Place and mode of occurrence

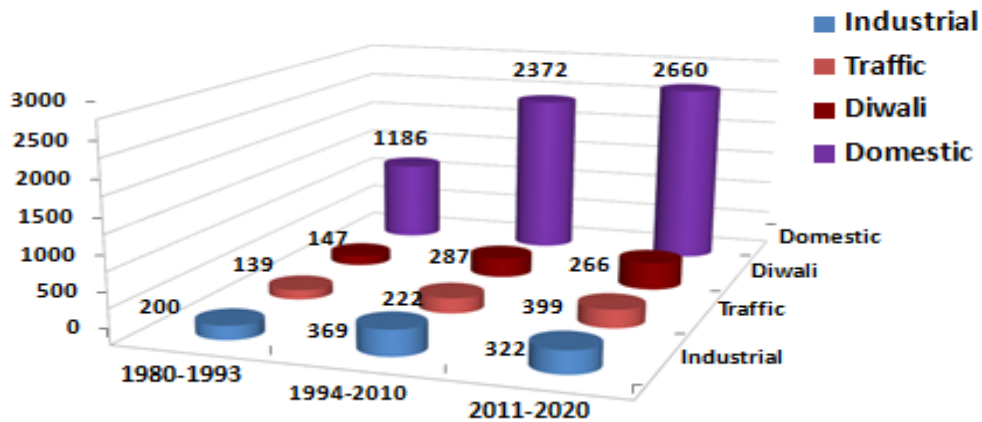
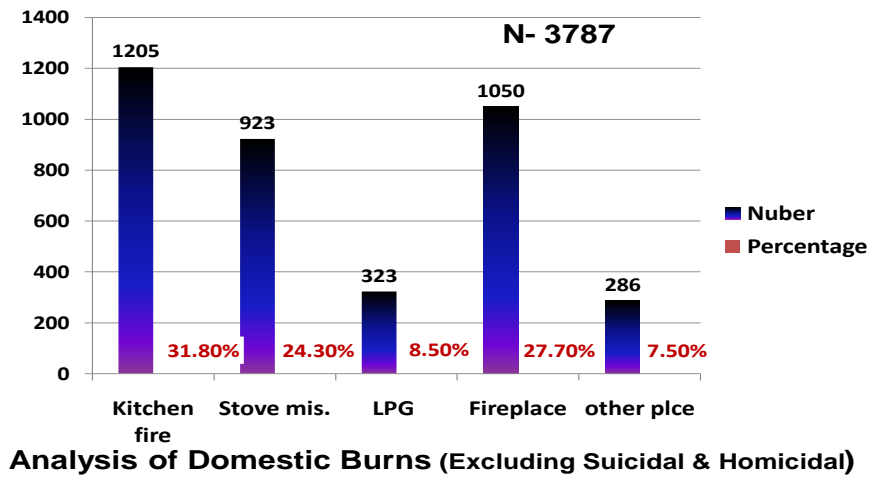


Fig V



The analysis of the methods of burn wound management in three different Blocks showed that, in Block I, 543(32.5%) patients were treated with exposure method, 1036 (61.9%) received closed dressings and 93(5.5%) patients underwent delayed skin grafting. In Block II, 1032 (31.7%) patients received closed dressings, 902 (27.7%) patients were treated with Boiled Potato Peel (BPP) bandages, 346(19.8%) were treated with new burn wound covers, 123(3.7%) patients were subjected to Early Excision and Skin Grafting and 547 (16.8%) patients underwent Delayed Skin

Grafting. In Block III, 676 (18.5%) cases were treated with closed dressings, 1832 (50.2%) patients were treated with new burn wound covers, 870 (23.8%) patients underwent Early Excision and Skin Grafting and only 269(7.3%) patients were treated with Delayed Skin Grafting.(Table III) The result reveals that there was significant decrease in closed dressing methods ($\chi^2 = 26.493, P < 0.001$) and very significant increase in the use of new burn wound covers ($\chi^2 = 13.202, P = 0.00028$) and Early Excision and Grafting ($\chi^2 = 14.691, P = 0.00013$) in the subsequent blocks.

Table III

Block	Exposure methods	Closed dressing	BPP Dressing	New Burn Wound Covers	Early Excision and Grafting	Delayed Skin Grafting	Total
Block I 1980-1993	543 (32.4%)	1036 (61.9%)	Nil	Nil	Nil	93 (5.3%)	1672
Block II 1994-2010	Nil	1032 (31.7%)	902 (27.7%)	646 (19.8%)	123 (3.7%)	547 (16.8%)	3250
Block III 2010-2020	Nil	676 (18.5%)	Nil	1832 (50.2%)	870 (23.8%)	269 (7.3%)	3647
Total	543	2744	902	2478	993	909	8569

Figures in the parentheses show row-wise percentages

Closed dressing: Chi-squared=26.493, P< 0.001

New burn wound cover: Chi-squared = 13.202, P=0.00028

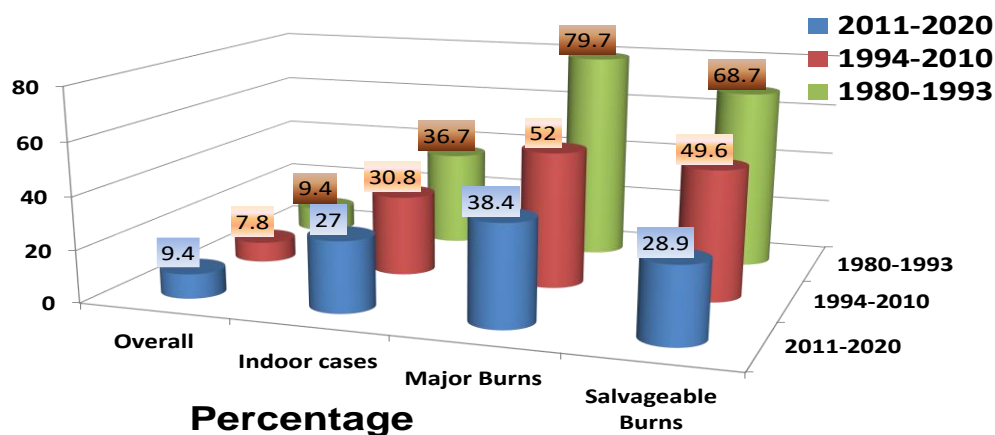
Early Excision & Grafting: Chi-squared = 14.691, P= 0.00013

The mortality figures of the burn patients were compared in three different periods (Table IV). The overall mortality of the patients was 9.4% in Block I, 7.8 % in Block II and 9.4% in Block III. The mortality of indoor patients was decreasing in the subsequent blocks (36.7% in Block I, 31.3% in Block II and 27.6% in Block III), though the decrease was not significant ($\chi^2=1.5168$ P 0.4684). A significant reduction in mortality ($\chi^2= 15.626$ P 0.0004) was however, evident in the recent years in cases of

major burns (above 20% TBSA) - (79.7% in Block I, 52.0% in Block II and 38.4% in Block III). We also analyzed the mortality patterns in the different blocks amongst the patients with 20-60% TBSA burn (salvageable patients). The analysis revealed a substantial and significant reduction in mortality ($\chi^2= 16.15$ P 0.0003) to 28.9% in Block III, in comparison to Block II (49.6%) and Block I (68.7%) (Fig VI).

Fig VI

Mortality 1980-2020



Improvement in morbidity was evident in the recent years with decrease in formation of scars and contractures in increased number of patients. There was **no scar** in 167 (10%) patients in Block I; in 651 (20%) patients in Block II and 350 (37%) in Block III, indicating a significant decrease in scar formation in subsequent years ($\chi^2= 16.687$, $P= 0.0002$).

Though not significant ($\chi^2=1.04$, $P=0.595$) **mild scars** were noticed in 502 (30%) cases in Block

I, 1040 (32%) in Block II and 1380 (40%) cases in Block III.

There was also significant reduction in **moderate scars** ($\chi^2=7.723$, $P=0.021$) -702 (40%) cases in Block I, 1072 (32%) in Block II and 729(20%) cases in Block III.

A significant reduction in **extensive scars** ($\chi^2=7.3158$, $P=0.0257$ was also noticed in Block III- 182 (5%) in comparison to Block II- 487(15%) and Block I- 301(18%), (Table IV &Fig VII).

Table IV
Mortality

YEAR	OVERALL MORTALITY	MORTALITY OF INDOOR CASES	MORTALITY IN MAJOR BURNS (20-100%)	MORTALITY IN SALVAGABLE BURNS (20- 60%)
1980-1993 Block I	158/1672 (9.4%)	158/430 (36.7%)	158/198 (79.7%)	110/160 (68.7%)
1994-2010 Block II	253/3250 (7.8%)	253/820 (30.8%)	253/486 (52.0%)	148/298 (49.6%)
2011-2020 Block III	344/3647 (9.4%)	344/1270(27.0%)	321/834 (38.4%)	191/659 (28.9%)
X squared	0.19248	1.5168	15.626	16.15
P value	0.9082	0.4684	0.0004	0.0003

Fig VII

Scar formation in Percentage 1980-2020

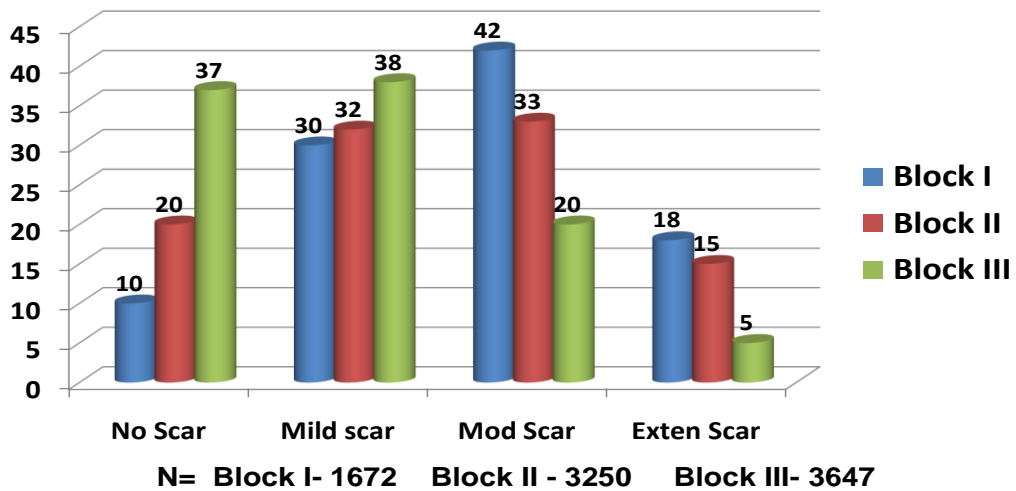


Table V
Scar formation in different Blocks (Number of cases with percentage)

Year	No scar No. & PC	Mild Scar No. & PC	Moderate Scar No. & PC	Extensive scar No. & PC	Total no. of Patients Number
Block I	167 10%	502 30%	702 42%	301 18%	1672
Block II	651 20%	1040 32%	1072 33%	487 15%	3250
Block III	1350 37%	1386 38%	729 20%	182 5%	3647
Total	2168 25.3%	2928 34.1%	2503 29.2%	970 11.3%	8569
X squared	16.687	1.04	7.7263	7.3158	
P Value	0.0002	0.595	0.021	0.02579	

Figures in the parentheses show row-wise percentages

Discussions- There is a significant variation in epidemiology of burns from one part of the world to another, as it depends on the level of civilization, industrialization, and culture, in addition to socio-economic conditions. The lack of uniformity between methodologies, in addition to the existence of lots of variables and differences in the study periods, makes any comparison with other studies difficult. Burn injuries and their related morbidity, disability, and mortality represent a public health problem of increasing importance in developing countries.

In our study, there were more male victims (52%) than females (48%), amongst the total number of patients reporting for treatment. But the females outnumbered the males amongst the indoor admissions. This was attributed to the females sustaining relatively more extensive burns than the males. These findings were in consistent with some other series - A A Khan et al showed male: female ratio as 1:1.4 [3], S Mzezewa et al reported 54% females against 46% males amongst 451 patients sustaining burns [4], Ashok K Gupta et al reported 54% males amongst 892 patients [5] and Wu-Chien Chien from Taiwan reported 67% males amongst 4741 patients [6]. Again, 77% of the burn injured patients in our series, were below 40 years of age. This distribution is similar to those found in other studies. Ashok K Gupta et al, in their study, had 79% of patients in the age group of 15-45 years [5]. M. Ansari et al, in their study of 1493 patients, found the mean age of the attendees to be 21.84+/-19.05 [7]. High incidence of burns, in this age group, is explained by the fact that they are

generally more active and exposed to hazardous atmosphere at home as well as at work.

There was a high incidence of accidental burns (95%) and very low incidence of suicidal and homicidal burns in our study. The significant increase in accidental and suicidal burns in the last two blocks in our study can be explained by the change in living standard and increased industrialization of the region in later parts of the study. Our findings were somewhat different from the findings of Ahmed I et al from Pakistan, who showed 82.02% accidental, 12.92% homicidal and 5.06% suicidal burns [8]. Majority of our patients (73.1%) sustained burn injuries at home. This figure is comparable to reports from other states of India and other developing countries like, Rajasthan, India (82.65%) [9] Nigeria (71%) [10] and Ghana (92%) [11].

In the present study, there were a large group of patients, who sustained burns in Diwali related events, mostly fire cracker burns. Diwali, a festival of light, is celebrated by a large number of Indian people by lighting lamps and bursting fire crackers. Children and young adults quite often suffer from burns of hands and face during the festival. Fireworks are displayed all over the world in different festivals and occasions throughout the year. Firecracker injuries in USA affected approximately 10000 persons annually from 1980-1989 as per the National Electronic Surveillance System [12]. Other statistics revealed 85800 pediatric fireworks related injuries in USA in a period of 13 years (1990-2003) [13]. We had 10.6% patients sustaining industrial burns, as the

earlier part of our study was in industrial area. This figure is much less in comparison to reported incidence by S P Pegg et al from Brisbane, who showed an incidence of 31.5% of industrial burns, reducing to 18.5% in next 10 years [14].

In our study, we treated a sizeable number of patients by open method of dressing in the early period before establishment of burn unit. This method was, however, discontinued in the subsequent periods because of the prevalence of infection. In a study of 156 cases of burn injuries, K. Adesunkanmiet al from Nigeria showed that by using the method of open dressing in 70.5% of cases, combined open and closed dressings in 22.4% cases and closed dressings in 10.3% cases, they had a mortality of 7.7% patients only. Of course, they also found an infection rate of 24.4% [15]. In a study of 144 burn patients, ranging from 1-99% TBSA, O.A. Olawoye et al also showed satisfactory results by open dressing using Silver sulphadiazine as local antimicrobials. They opined- "Open burn wound dressing with silver sulphadiazine offers a satisfactory outcome and should be considered for burn dressing in low resource settings." [16]

The overall mortality figures of our study were low in all the blocks, compared to the study by Ashok K Gupta et al from India (mortality 40%) [5], Olde A O et al from Nigeria (mortality 19.4%) [17], M Subrahmanyam from Maharashtra, India (56.5%) [18] and M. Gupta et al from Rajasthan, India (mortality 43.8%) [9]. The mortality figures of the indoor cases and those of major burns were found to be significantly low in block III in comparison to Block I in our series. These findings were in contrast to the study of M Gupta et al, who stated, "in patients with over 40% burns, the mortality was 80%, there was no survivors in patients with over 70% TBSA burns in our series" [9]. H tang et al from China in their study of 73 cases of full thickness burn above 70% TBSA, however, showed better result- 21 cases (28.8%) were cured and 52 cases (71.2%) died [19]. The reduction of mortality of major burn in our series was attributed to application of early excision and skin grafting in a large number of cases in the subsequent blocks. This is in conformity with some

other studies, which also showed reduction in mortality after early excision and grafting in patients not having inhalation injuries [20, 21]. The widely used Vancouver scar scale, which takes into consideration the vascularity, height of the scar, pliability and pigmentation to determine the outcome of burn injuries after treatment [22], was also used in our study. The increase in the percentage of patients having no scars and decrease in the percentage of patients having moderate and extensive scars in later periods, show that there was improvement in functional as well as cosmetic outcome of the patients undergoing advanced management. The outcome mentioned was the combined result of early excision and skin grafting, infection control, strict compliance to pressure therapy and better follow-up of patients after discharge from hospital. That the procedure of early excision and skin grafting alone can improve the functional and cosmetic outcome, but cannot improve the scar quality has been emphasized in different studies [23,24].

Conclusions

This study has given us an insight into the magnitude of problems of burn injuries in the North Eastern state of Assam. It has also shown that individual efforts in absence of organized facilities in burn care can do a lot to mitigate the sufferings of the burn patients. The study also depicts the fact that introduction of new methods and technique in burn care can improve the results to a great extent.

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Conflict of interest

The author declares no conflict of interest related to this article.

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