



ST.PAUL`S HOSPITAL MILLENNIUM MEDICAL COLLEGE
DEPARTMENT OF SURGERY

**RETROSPECTIVE STUDY ON PATTERN OF BURN ADMISSIONS: CAUSE, TYPES,
CLINICAL PRESENTATION AND THEIR MANAGEMENT OUTCOME.**

PRINCIPAL INVESTIGATOR

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SEPTEMBER 2018

ADDIS ABEBA, ETHIOPIA

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**A RESEARCH THESIS SUBMITTED TO SCHOOL OF POST GRADUATE STUDIES
ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE DEPARTMENT OF
SURGERY FOR PARTIAL FULFILMENT OF SPECIALITY IN GENERAL SURGERY.**

SEPTEMBER 2018

ADDIS ABABA: ETHIOPIA

ABSTRACT

Background

A burn is an injury to the skin or other organic tissue primarily caused by heat or due to radiation, radioactivity, electricity, friction or contact with chemicals. Burn injuries are a serious global public health problem, burn account for an estimated 180 000 deaths annually. The majority of these occur in low- and middle-income countries and almost two thirds occur in Africa and South-East Asia regions. (1)

Objective

To determine the magnitude, cause, types, clinical presentation, and management of burn injury among patients admitted in Addis Ababa Burn, Emergency and trauma center.

Methods

The study was conducted in AaBET hospital - SPHMMC department of Surgery from the period of August 1 2016 to January 31 2018. Aretrospective record review study design was employed to assess the magnitude, cause, types, clinical presentation and management outcome of burn injuries. The collected data was cleaned, checked for completeness, coded and analyzed using SPSS. Chi-square test will be employed to determine relationship of different factors.

Result

The prevalence of burn injury in this study is 3.1%. The female to male ratio was 1.2:1. The highest proportion of admission was comprising by patients from age 1 to 9 years of age which 36.8 % from the total admission. The minimum age at admission was 2 month and maximum were 62 years. The most common cause of burn was scald which account 41.8%. The overall median TBSA% was 12%. Home is the most common place of burn injury which accounts 80.5 % of all burn injuries. Comorbid illness was found in 13% of our patients of which 62.5% patients had epilepsy. Wound infection is the most common complication which occurs in 7.6% of the patients. In this study debridement was the most commonly performed surgery it was done in 86 patients. The overall mortality was 5.9%. Post burn disability was seen in 8.6% of patients.

Conclusion

Children less than 9 years of age had the highest proportion of patients. This may be due to their poorly developed motor skill and their poor understanding of harmful things. Health education should be given for parents and caretakers about prevention of this injury.

Key word: AaBET, SPHMMC, TBSA%, Burn complication, Scald

ACKNOWLEDGEMENTS

I would like to thank SPHMMC, department of surgery, AaBET hospital burn unit for allowing me to conduct this thesis. I am thankful to my advisor, Dr LeuleGetachew, Dr MekiKiyarand Dr Hananiah Djimbayew whose encouragement, guidance and support enabled me to develop an understanding of the subject. I offer my regards and blessing to all of those who supported in developing this proposal.

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LIST OF ACRONYMS

AaBET - Addis Ababa Burn, Emergency and Trauma center

AAU - Addis Ababa University

AKI – Acute Kidney Injury

BUN/Cr – Blood urea nitrogen / creatinine

CEO - Chief Executive Officer

CHR - Calgary Health Region

DALYs- Disability-Adjusted Life-Years

DM- Diabetics Mellites

ETB-Ethiopian Birr

E.C -Ethiopian Calendar

GC- Gregorian Calendar

HAI-Hospital Acquired Infection

LMICs-Low and Middle Income Countries

MD -Medical Doctor

PI- Principal Investigator

SPHMMC- Saint Paul's Hospital Millennium Medical College

TBI – Traumatic Brain Injury

TBSA- Total Body Surface Area

WHO - World Health Organization

1. INTRODUCTION

1.1. Background

A burn is an injury to the skin or other organic tissue primarily caused by heat or due to radiation, radioactivity, electricity, friction or contact with chemicals. Burn injuries are a serious global public health problem, burn account for an estimated 180 000 deaths annually. The majority of these occur in low- and middle-income countries and almost two thirds occur in Africa and South-East Asia regions. (1)

Risk factors for burns include those related to socioeconomic status, race and ethnicity, age, and gender, as well as those factors pertaining to region of residence, intent of injury, and comorbidity. (2) Gender differences play a significant role in the risk of burn injuries, across a spectrum with a predominance of women injured in fires from cooking and heating fuels in the developing world and industrial accidents primarily affecting men in developed nations. Children are particularly vulnerable to burn injuries, accounting for almost 50% of all burn patients in some studies. Finally, the elderly form a rapidly increasing proportion of the population in many countries, and are often burdened with comorbidities that are likely to pose significant challenges in burn care. (3)

Burns can occur by any of the following: flames, electricity, chemicals, hot liquids, or contact with any hot object. Severe scarring and contracture, as well as death, are complications from burn injuries. (4) Scald burns sustained indoors are the most common across all age groups. (5)

Burn wounds are stratified into 4 categories of increasing depth: epidermal, superficial partial-thickness, deep partial-thickness, and full-thickness. Superficial burns affect only the epidermis of the skin. They are usually caused by ultraviolet radiation from the sun. Superficial partial-thickness burns extend through the epidermis downward into the papillary, or superficial, layer of the dermis. Deep partial-thickness burns extend downward into the reticular, or deeper, layer of the dermis and present as mixed red or waxy white. A full-thickness burn extends through the epidermis and dermis and into the subcutaneous tissue layer. (6)

The depth of a burn wound and/or its healing potential are the most important determinants of the therapeutic management and of the residual morbidity or scarring. (7) Management of burns and their sequelae even in well-equipped, modern burn units of advanced affluent societies remains demanding and extremely costly. Undoubtedly, in most low and middle income countries (LMICs) with limited resources and inaccessibility to sophisticated skills and

technologies, the same standard of care is obviously not possible. Unfortunately, over 90% of fatal fire-related burns occur in developing or LMICs with South-East Asia alone accounting for over half of these fire-related deaths. If burn prevention is an essential part of any integrated burn management protocol anywhere, focusing on burn prevention in LMICs rather than treatment cannot be over-emphasized where it remains the major and probably the only available way of reducing the current state of morbidity and mortality. Like other injury mechanisms, the prevention of burns requires adequate knowledge of the epidemiological characteristics and associated risk factors, it is hence important to define clearly, the social, cultural and economic factors, which contribute to burncausation. (8)

Burn injuries are a major cause of prolonged hospital stays, disfigurement, disability, and death in Africa Region. Evidence shows that prevention strategies can work. However, prevention strategies need to be tailored to the specific environment taking into account local risk factors and available resources. An important factor in reducing burn morbidity, especially in children, is to educate people that burns are preventable in most cases and that most burns occur in the home around cooking fires. Children need to be kept away from fires. Epileptics should be monitored for medication and kept away from cooking fires as well. Community members need to be encouraged to bring wrong doers to the police. (9)

1.2. Statement of the problem

Each year more than 300 000 people die from fire-related burn injuries. Millions more suffer from burn-related disabilities and disfigurements which have psychological, social and economic effects on both the survivors and their families. The burden of burn injury is one that falls predominantly on the world's poor: 95% of fire-related burn deaths occur in low- and middle-income countries (LMICs). Not only are burn deaths and injuries more common in people of lower socioeconomic status, but the survivors find their pre-injury poverty levels worsen after recovery. (10)

The impact of burns on communities in developing countries is substantial, due to the cost of treatment and rehabilitation, the loss of earnings, and the loss of working hours. Furthermore, the financial cost of burns to hospitals and health systems can be extensive, a result of prolonged hospital admission, the use of bandages and antibacterial lubricants, and in the case of superimposed pathogens, the need for systemic therapy. Patients can rarely afford these costs and governmental or nongovernmental organizations must bear them. (11)

With its large rural population, limited data on burns incidence and limited resources, Ethiopia faces many challenges common to low- and middle-Income countries globally with a high number of burn injuries. Few staff outside the national centre in Addis have received any training in burns, which has a huge impact on patient care and the clinical outcomes they experience. Knowledge of effective prevention and first aid among the wider public is also extremely limited. The national centre in Addis has a large backlog of patients for surgery due to the high ratio of patients relative to existing capacity. (12)

1.3. Rational of the study

To have precise knowledge of burn admission patterns in the newly established and the only trauma center AaBET hospital-SPHMMC help to understand, encourage and monitor the progress in reducing the burden and avoiding complications using low cost approaches and promotion of education on burn prevention.

This study will provide information about the gap between the magnitude of burn injury and the limited burn service available. It will magnify recognition of the need to develop other centers which give burn service in the country.

The result of this study will provide background data and also will be used as baseline for further researches.

1.4. Literature review

Literatures indicate that burn injuries remain a major health problem in developing countries.

A review of this literature will show the extent of the problem of burn injuries in many aspects. Information from the literatures will be useful for planning prevention strategies and identifying further research questions that need to be answered.

One-year cross sectional study was conducted on the Epidemiology and Outcome of Burn Injuries in Sri Dr. Prabhakar Kore Hospital and Medical research centre in India. This research shows more than 50% of the patients were females (52.63%) and 10% were pregnant at the time of burn injury. The mean age was 29.32 years ranging from 4 months to 95 years. Maximum number of females (97.5%) sustained burn injuries at home compared to 36.11% males sustaining injuries outdoors. ($p=0.000$). Majority (81.59%) were allegedly accidental injuries followed by 15.79% suicidal and 2.63% homicidal. Flame injuries contributed to 92.5% of burns in females ($p=0.006$). A cooking appliance was responsible for 45.0% injuries in females. Electrical injuries (19.44%) were significantly more in males ($p=0.005$). In almost 39% of males, total burn surface area was $<19\%$ whereas in 40% females, total burn surface area was $>61\%$. ($p=0.004$). The case fatality rate was 31.58%. (13)

A population-based study of the epidemiology of acute adult burn injury was conducted in Calgary Canada a total of 928 burn-injured patients were identified. The highest incidence of burn injury admissions in the CHR occurred in 1996 (12.2 burn injury admissions per 100,000 population) and 2004 (12.3 admissions per 100,000 population). The largest number of burn injury admissions occurred during the months of July and August (23.3%), while the fewest occurred during the winter months of February and December (11.9%). Mean patient age was 45.2 years (range 18-97) and 658 (70.9%) were male. The majority of our patients were admitted with second-degree burns (48.7%) and burns of the head and neck were the most prevalent (22.2%). The mean length of hospital stay for burn patients was 20.4 days (range 1-312). Over the course of the 10 years of the study, 9 (1.0%) burn patients died during their hospital stay. In univariate analyses, burn survivors differed significantly from non-survivors with respect to mean age, burn degree, body part burned and year of admission. In adjusted analyses, survivors and non-survivors differed significantly with respect to year and month of admission, degree of

burn, patient age and length of stay. Factors significantly associated with increase length of hospital stay included degree of burn, older patient age and hospital site. (14)

A retrospective data analysis was performed on all hospitalized patients to the burn center at the Chinghai hospital, one of major burn centers in East China on the Incidence and outcome. The research included 3376 patients in this study. Among them, 48.1% were from 27 provinces out of Shanghai and nearly 90% were from East China. August saw the most admissions and November saw the fewest. Spring and summer separately dominated in number of female and male patients. Children aged 2–5 and working-age adult were the most commonly treated. Home was the commonest place of injury, followed by industrial-related places, outdoors, public buildings, and vehicles or roads. Scalds remained the primary reason, followed by fire, contact burns, electricity, and chemicals. The average %TBSA of male patients was 14.2 ± 21.3 , significantly different from that of female patients (10.4 ± 16.9). Extremities were the most vulnerable body region burned, followed by the trunk, face and hands. The average hospital length of stay in male patients was 25.4 ± 72.4 days, significantly different from that of females' 19.9 ± 27.6 days. The total mortality was 1.8% and the lethal area burned resulting in 50% mortality was 96.5% TBSA. (15)

A Retrospective Analysis of the Burn Injury from patients Records in the Emergency Department, was done in Turkey the result showed mean of patients' ages was 25.3 ± 22.3 years. The most prevalence of burn was in the 0-6 age group and most of which was hot liquid scalding (71.3%). The most affected parts of the body were the left and right upper extremities. (16)

In Nepal a study was done on burn injuries in Paediatric Population the study revealed that the etiology of burn injuries varies as the child progresses through the stages of normal development. Scald burn predominated in most series and constitute seventy percent of all thermal injuries in infants, toddlers, and preschool children. Scalds mostly occur at home and mostly affect upper part of body. Incidence of spill is always more than immersions. (17)

Prevention-oriented epidemiology of burns in Ardabil provincial burn centre was conducted in Iran. Between 2007 and 2008, 237 burn victims were enrolled into a descriptive study. Males constituted 56% of victims. Mean age was 22 years. The most severe burns occurred between the ages of 18 and 32 years, and were mainly flame related. Both in case of flame and non-flame burns, women suffered more severe burns and mortality than men. However, with respect to non-

flame burns of which most were scalds, the majority of the severe cases involved children under the age of 5 years. More than 80% of burns occurred at home. The kitchen was the main place of injury in 47% of cases, followed by living rooms in 28%. Nearly 45% of burns were scalds and 47% were flame burns. The main container was the samovar in 37%, followed by kettles in 32% and pots in 22%. The overturning of a container was the major mechanism of contact with hot liquids in 86%. Bumping into a container was the main scenario of a scald injury, constituting nearly 70% of the cases. The difference between flame and non-flame burns in the distribution of burns in extremities was not statistically significant, but head and neck burns were 3.7 times more likely to be caused by flame. The two most important injury patterns, more common among women, were getting burned while using a camping gas stove or while refilling the chamber of kerosene-burning appliances without first extinguishing them. Domestic burns among children and young women are a priority in injury-prevention programmes. Camping gas stoves, valors (traditional dual-purpose heating and cooking appliances) and samovars can be considered as target appliances for burn-specific home-safety-promotion efforts in this area or in similar settings. (18)

A systemic review of low and middle-income countries was done on epidemiology of burn in WHO defined African region. This research resulted in 12,568 potential abstracts. Through multiple rounds of screening using criteria determined a priori, 81 manuscripts with hospital-based epidemiology as well as eleven manuscripts that included population-based epidemiology were identified. Although the studies varied in methodology, several trends were noted: young children appear to be at most risk; most individuals were burned at home; and hot liquids and flame are the most common aetiologies. (19)

Prospective study was carried out on 880 acutely burned patients admitted to the Burn Unit of Ain Shams University in Cairo, Egypt, during the period from the 1 May 1995 to the 31 October 2001, with the objective to analyze the epidemiological features of burned patients in our country. The means of age and percentage total body surface area burned (TBSA) were 27.8 $\pm$ 2.9 years and 32 $\pm$ 5.7%, respectively. Most of the patients were city dwellers and were self-referred to the Burn Unit. There were no significant yearly variations in hospital admissions. Seasonal variations in the form of peaks in winter and spring were noticed. Females (53.1%) were more prevalent than males (46.8%). Adults (61%) superseded children (39%). Male children (42.7%) population exceeded female children (35.8%). In contrast, adult females

(64.1%) surpassed adult males (57.2%). The commonest burn location was home followed by outdoors then, work locations. Females were most commonly burned at home and mainly suffered from flame and scald burns. Males were most commonly burned in outdoor and work locations than at home and mainly sustained electric and flame burns. There was no difference in the mean percentage TBSB and burn depth in both sexes. Children were mostly burned at home and were mainly victims of scald and flame burns. They had lower rates of full thickness burns compared to adults. Adults were mostly burned in outdoor and work locations and mainly sustained flame and electrical injuries. The results of this study clearly highlighted the specific epidemiological features of burned patients in our area, and thus should provide the necessary information to develop proper burn prevention programs, thereby reducing the frequency of burns and burn-related deaths. (20)

The spectrum and outcome of burns at a regional hospital in South Africa shows a total of 450 patients were admitted. Two hundred and thirty-five were male. There were 203 burnt children with an average age of 3 years (range 6 months to 12 years). Average age for adults was 40 years (range 13–82 years). The average surface area burnt in children was 7.5% versus 23% in adults. Of those who died, the average surface area burnt was 54%. In adults the average burn depth was superficial in 30%, deep dermal in 20% and full thickness in 50%. The aetiology of the burn was flame 70%, hot water 25% and miscellaneous 5%. In children the breakdown of burn depth was superficial in 77%, deep dermal in 15% and full thickness in 8%. The aetiology was hot water 83%, fire 6%, electrical 6% and miscellaneous 5%. The last mentioned included hot oil or porridge (15), electrical (10), chemical (6), flash burns (8) and lightning (4). Fifty percent of adults were epileptic and had sustained their burn wound during a seizure. In this group, over 40% had previously sustained burns. Fifteen percent had a delayed presentation on an average of 11 days. Hospital stay averaged 68 days (3.5 days per percent burn: range 1–161 days). Two hundred and two (45%) patients required skin grafting. The average time from burn to graft was 51 days (range 12–138). There were 40 deaths (9%) with an average age of 50 years (range 6 months to 82 years) and an average total burn surface area of 50% (range 14–85%). Aetiology of the burn in the deaths was fire in 30, lightning 4 and hot water 6. Cause of death was burn wound sepsis in 38 and inadequate resuscitation in 2.(21)

Epidemiology of burn in a national burn center was studied in Indonesia a total of 414 subjects were involved in this study. Of these, 284 (68.6%) subjects were >18 years old, while 130 (31.4%) were ≤18 years old. The highest proportion of admission was from the 1 to 4 years old age group. Most of the patients in the paediatric group (108 patients; 82.3%) did not have an occupation, making “Not Working” group as the most common occupational profile, while 82 (28.9%) of the adult population were laborers. Scald was the cause of burn in 66 (50.8%) subjects the pediatric group, whereas the burns in 201 (70.8%) adult subjects were caused by flame. (22)

A study done in AddisAbaba Ethiopia on the Description of patients admitted to a burn unit of Yekatit 12 Hospital, Addis Ababa, Ethiopia. In the study, the median age was 22 years (range 2 months to 70 years). Among them 64.5% were female and 35.5% were male. Scald was a common cause of burns for young children and flame was a common cause for adults. The frequent mechanism of burn injury for adults was exploding kerosene stove. The average mean total body surface area (TBSA) burnt was 17.1 %. The overall median hospital stay was 44 days. Most of the adults (74.7%) had delayed split thickness grafting. (23)

Cross sectional survey was done on Epidemiology of burn injuries in Mekele Town; Northern Ethiopia the study revealed the annual incidence in burns was 1.2%. Burn had the highest incidence among children less than 5 years old (4.8%). Scald (59%) was the leading cause of burn followed by flame (34%). Most burns occurred at home (81%). Eighty-nine-point four percent of the burns healed with minor or no sequelae, 9.4% developed sequelae and the mortality was 1%. Crowding and employment were significant risk factors for burn injury. Domestic burn injuries were common among women of reproductive age and work-related burns were more common among men. Many people (36%) used harmful substances with deleterious consequences as first aid measure for burn. (24)

The study on magnitude, clinical presentation, and outcome of pediatric burn injuries at Yekatit 12 hospital, Addis Ababa, Ethiopia shows burn accounted for 6.4% of patients who had visited the pediatric department of Yekatit 12 hospital from December- June 2014. Children less than 3 years of age had the highest proportion of patients (53.3%) and the median total body surface area (TBSA) burned were 11% with a range of 1-95%. The most frequent burn injuries were scalds, followed by flame burns, electrical burns, contact burns with hot solid object and chemical burns with 60%, 32.9%, 3.8%, 2.4% and 0.9%

respectively. Most of the burns (49%) healed with no or minor sequelae and 7.85% of patients died in the study period. Cause of burn has statistically significant association with death ($P=0.027$). (25)

2. OBJECTIVES

2.1. General objectives

To determine the magnitude, cause, types, clinical presentation, and management outcome of burn injury among patients admitted at AaBET hospital.

2.2. Specific objectives

- To determine the magnitude of burn injuries
- To determine the cause and settings of burn injuries
- To describe socio-demographic distribution of burn injuries
- To describe the clinical conditions and types of burn patients at time of presentation
- To determine morbidity and mortality of burn injuries.

3. METHOD AND MATERIAL

3.1. Study period and area

The study was conducted at AaBET hospital-SPHMMC, department of Surgery from the period of August 1 2016 to January 31 2018.

The study was conducted at AaBET Hospital which is located in Addis Ababa, Ethiopia. AaBET Hospital is the only trauma center in the country, which serves as a referral center for patients from Addis Ababa and all over the country. AaBET Hospital is located in the northern part of Addis Ababa. It is also a teaching hospital for SPHMMC & AAU for both under graduate and post graduate students. The hospital has Orthopedics, General Surgery, Neurosurgery and Emergency medicine, plastic and Reconstructive surgery departments. The hospital has a total of 108 beds out of which the burn unit has a dedicated ward with 19 beds with 3 plastic and reconstructive surgeons and 2 general practitioners

3.2. Study design

A retrospective record review study design was employed to assess the magnitude, cause, types, clinical presentation and management outcome of burn injuries.

3.3. Source population

All patients admitted to AaBET hospital during the study period.

3.4. Study population

The study population was Patients who were admitted with the diagnosis of burn injuries at AaBET Hospital- SPHMMC Addis Ababa, Ethiopia, from August 1 2016 to January 31 2018.

3.5. Sample size determination and sampling technique

All the patients who were admitted to the burn unit during the study period were included. Sampling was not used.

3.6. Operational definitions

Burn: is an injury to the skin or other organic tissue primarily caused by heat or due to radiation, radioactivity, electricity, friction or contact with chemicals.

TBSA: is an estimate of the percentage of total body surface area involved in burn exposure and injury using Lund and Browder estimation method.

Scalds: a type of burn injury caused by hot liquids or gases

First-degree (superficial): burns only the epidermis or outer layer of skin is affected. The burn site is red, painful, dry, and with no blisters.

Second-degree (partial thickness): burns involve the epidermis and part of the dermis layer of skin. The burn site appears red, blistered, and may be swollen and painful.

Third-degree (full thickness): burns destroy the epidermis and dermis. It may also damage the underlying bones, muscles, and tendons. The burn site appears white or charred. There is no sensation in the area since the nerve endings are destroyed.

Prehospital intervention: management at the site of the trauma, it begins at the scene of the accident and concludes when specialised/institutional medical care is obtained.

Disability: impairments, activity limitations, and participation restrictions.

Management outcome: includes recovery without any complication, recovery with contracture, scarring, disfigurement, disability and mortality.

3.7. Eligibility criteria.

3.7.1. Inclusion criteria

Burn patients admitted in AaBET hospital burn unit.

3.7.2. Exclusion criteria

Any patient chart containing insufficient data will be excluded from the study.

Patient transferred to other hospital and Self-discharged patients without treatment completion will be excluded

3.8. Measurement variables

3.8.1. Dependent variables

Outcomes of burn injuries

3.8.2. Independent variables

Age

Sex

Length of hospital stay

Degree of burn

Cause of burn

Disability

TBSA

Anatomic location/s of the burn injury

Concomitant medical conditions

Associated Injuries

Presence of disability

Complication

Provision of pre-hospital care or first aid

Setting of injury

3.9. Data collection

For data collection a structured pre-tested data collection format was used. Data was collected from the ward registers, operation theater log book and patient charts. Data was collected by the principal investigator and trained final year medical students. The primary investigator was responsible for monitoring the data collection process.

3.10. Data quality control

Before data collection has started the data, extraction format was tested and reviewed. After data collection the data in the table was cross checked with the data in the register by taking 5% of the samples randomly. Data collection process was supervised by the investigator for completeness and edited accordingly.

3.11. Data analysis

The collected data was cleaned, checked for completeness, coded and analyzed using SPSS. The data was presented in tables, pie charts and bar- graphs as necessary.

3.12. Ethical considerations

Permission was obtained from SPHMMC ethical review board. Official letter was submitted to AaBET hospital CEO and burn unit to conduct this research. Confidentiality was kept throughout the study by keeping all paper and computer records of the patient in a secured place at the department office throughout the study.

3.13. Limitations

A retrospective cross-sectional study design was employed to conduct this study due to time constraint. All the data was collected from patients' medical record cards, inpatient logbook and operation registration logbooks so our study was limited by incomplete medical records. The common missed recordings were co-morbidities, pre-hospital interventions and complications of the patients. Other studies are required to investigate the long-term outcome prognostic factors of burn injuries in Ethiopia.

3.14. Dissemination of the results

The results of the study will be disseminated to SPHMMC department of surgery and other bodies who need the research accordingly. The paper will also be submitted to national or international peer reviewed scientific journals for publication.

4. RESULT

The prevalence of burn injury in this study was 3.1%. From all admitted patients to burn unit during the study period, 185 were eligible based on the inclusion and exclusion criteria. The distribution of admission according to variables are mentioned in the following tables and graphs.

4.1. Admission distribution by age and gender

The highest proportion of admission was recorded by patients from age of 1 to 9 years which include 68 patients and 36.8 % from the total admission. The minimum admission age was 2 month and the maximum were 62 years. The majority of the subjects were females which account 54.1% with a ratio of 1.2: 1 between male and female. The distribution of admission according to age and gender is given in Table 1 and fig1.

Table 1- Age distribution of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018.

Age	Frequency	Percent
1-9 yr.	68	36.8
10-19 yr.	40	21.6
20-29yr.	44	23.8
30-39yr.	21	11.4
40-49yr.	6	3.2
>50 yrs	6	3.2
Total	185	100

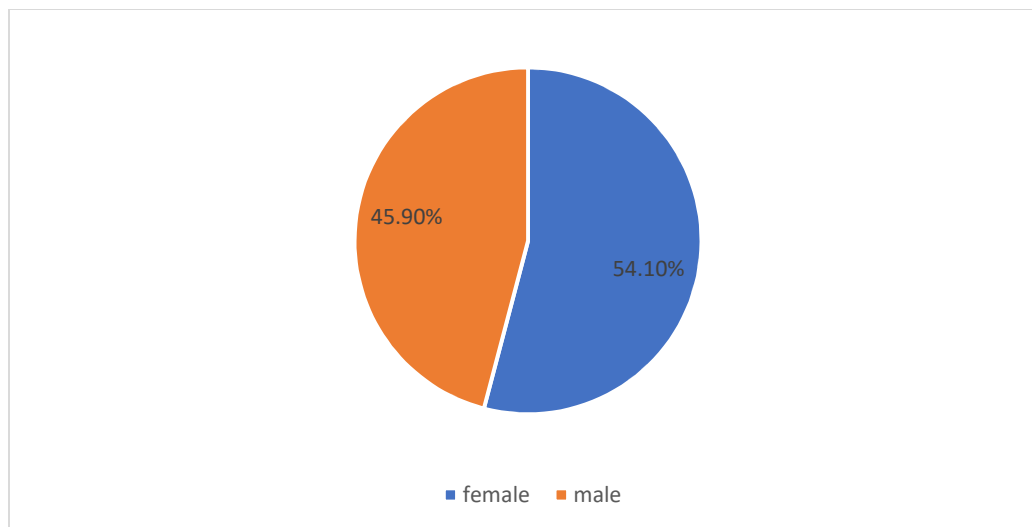


Fig 1. Gender distribution of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018

4.2 Etiology

Scald burn is the most common cause of burn in this study which accounts 48.1% from all the admissions were caused by scald. The second most common cause of burn injury in this study was flame burn which account 31.9% from all admissions. The least common type of burn is chemical burn which accounts only 1.1%. The distribution of etiology is presented in table 3.

Table 2- Causes of burn of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018.

Etiology of burn injury	Frequency	percent
Scald	89	48.1
Flame	59	31.9
Electrical	35	18.9
Chemical	2	1.1
Total	185	100

4.3. Depth of Burn

Among all patients 133 patients had second degree burn which accounts 71.9%. Third degree burn was seen in 37 patients of all admissions. First degree burn was noticed in only 15 case. The distribution of depth of burn is presented in table 4.

Table 3- Depth of burn of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018.

Degree of burn injury	Frequency	percent
First degree	15	8.1
Second degree	133	71.9
Third degree	37	20
Total	185	100

4.4 Extent of burn injury (TBSA %)

From all admissions 42.2 % of patients admitted in ward had TBSA% of 10-30%. There were 4 patients with body surface area of more than 70%. The overall mean TBSA% was 12.5%.

Table 4 - Extent of burn injury of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018

Extent of burn injury in TBSA%	Frequency	percent
1-10%	72	38.9
11-30%	78	42.2
31-50%	17	9.1
51-70%	11	5.9
70-100%	4	2.2
Unspecified	3	1.6
Total	185	100

4.5 Patient's arrival at hospital after burn injury

From all 185 subjects 61.1% of patient came to hospital within 12 hours. There was 4.9% of patients came after 20 days of injury.

Table 5- hospital arrival time of burn of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018.

Time of arrival to hospital after injury	Frequency	percent
0-12hrs	113	61.1
12-24hrs	31	16.8
24hrs -10 days	25	13.5
10 -20 days	7	3.8
>20 days	9	4.9
Total	185	100

4.6 Place of burn

Most burn injuries occur inside the house 149 subjects which was 80.5 % followed by work place 22 subjects. Only 6 burn injury occur out door.

Table 6 -Place of burn injury of all patients admitted to AaBET hospital burn unit from august 1 2016 to January 31st 2018

Place of burn	Frequency	percent
Home	149	80.5
Work place	22	11.9
Outdoor	6	3.2
Unspecified	8	4.3
Total	185	100

4.7Pre-hospital interventions

From all the subjects in this study 9.2 % of patients applied cold water and 1.6 % applied oil. Majority of patients (63.2%) did not have any pre-hospital intervention.

Table 7- prehospital intervention of burn of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018

Prehospital intervention	Frequency	percent
Cold water	17	9.2
Oil	3	1.6
Unspecifies	47	25.4
No prehospital intervention	117	63.2
Total	185	100

4.8 Affected anatomic site

The three most common burn sites include upper limb and lower limb and anterior trunk. Upper limb injuries account 29.1% followed by lower limb injuries which account 25.9%. Perineum and genital are the list affected anatomic sites.

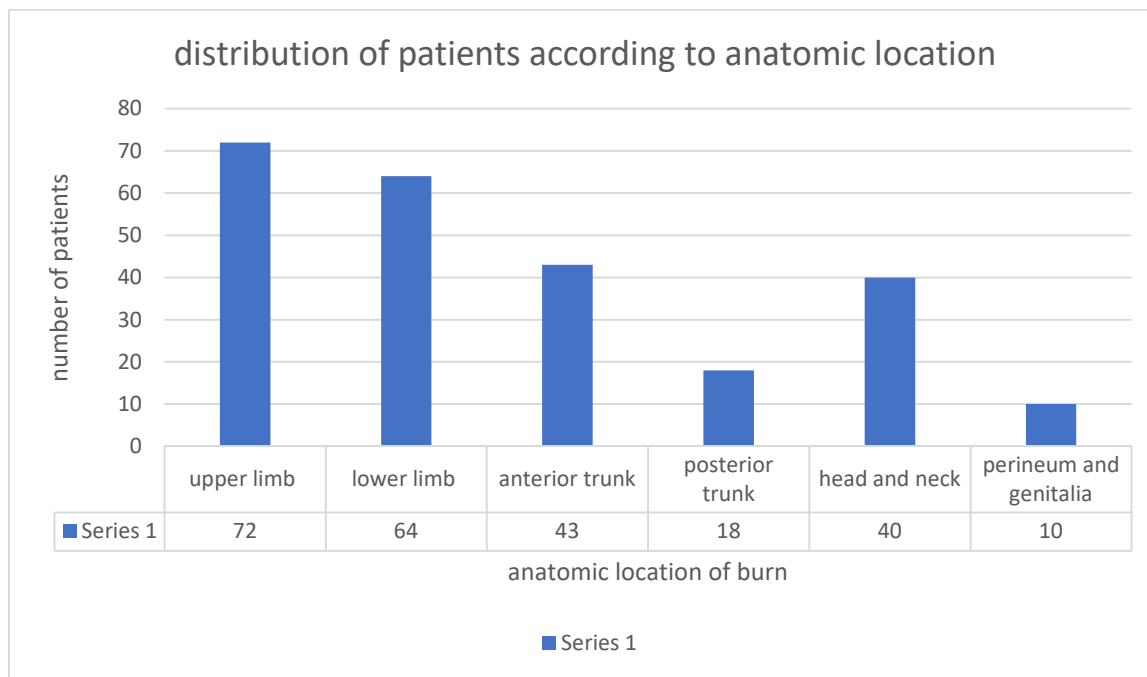


Fig 2. Anatomic location of burn of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018

4.9 Occurrence of injury

Majority of admissions are due to non-intentional accidental injuries which account for 97.3%. Only 2.7% of admissions are due to intentional assault burn injuries.

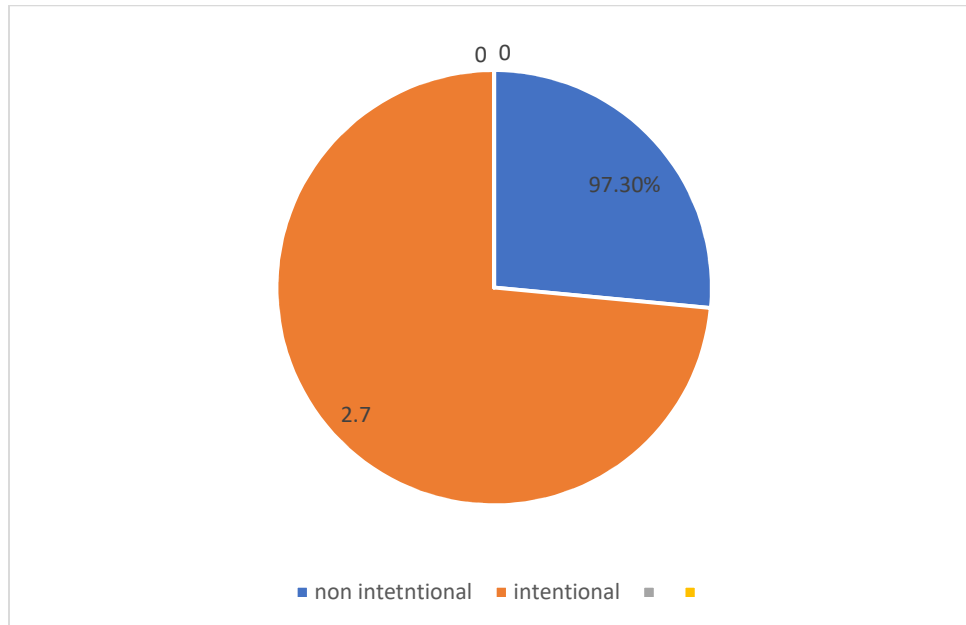


Fig.3– Occurrence of burn of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018.

4.10 Comorbid illness

In this study 13% of patients had comorbid illness from this 62.5% had epilepsy. There were 15 patients with epilepsy all of them sustained burn injury during their seizure attack. The second common concomitant illness is diabetes there were three patients with diabetes from all admission.

Table 8- Comorbidities of burn of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018.

Concomitant illness	Frequency	percent
epilepsy	15	8.1
DM	4	2.1
Others	5	2.7
None	161	87
Total	185	100

4.11 Associated injuries

The most common associated injury is fracture is which occur in 2.2 % followed by TBI and tendon injury each 3 patients.

Table 9 - Associated injuries of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018.

Associated injuries	Frequency	percent
Fracture	4	2.1
TBI	3	1.6
Tendon injuries	3	1.6
None	175	94.5
Total	185	100

4.12 Clinical presentation

Majority of patients 85.4 % presented with burned skin. There were 10 patients (5.4%) presented with loss of consciousness and 6 patients presented with shock and 2 patients presented with compartment syndrome. 1.6 % of patients presented with infected wound.

Table 10 - Clinical presentation of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018.

Clinical manifestations	Frequency	percent
burned skin	158	85.4
airway compromise	3	1.6
loss of consciousness	10	5.4
Shock	6	3.2
compartment syndrome	2	1.1
Contracture	3	1.6
infected wound	3	1.6
Total	185	100

4.13 Length of hospital stay

The median length of stay in this study was 29 days. From all admissions 41.6 %of patients stayed more than 31 days in the hospital and 23.2% stayed less than ten days in the hospital.

Table 11-Length of hospital stay of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018

Length of hospital stay	Frequency	percent
1-10	43	23.2
11-20	37	20
21-30	28	15.1
>31	77	41.6
Total	185	100

4.14 Complications

The most common complication in this study is wound infection which occurs in 7.6% of patients followed by sepsis and HAP 7% and 5.4% respectively.

Table 12-Complication of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018.

Complication	Frequency	percent
wound infection	14	7.6
HAP	10	5.4
AKI	2	1
Contracture	3	1.6
sepsis	13	7
None	143	77.2
Total	185	100

4.15 Surgery

In this study debridement was the most commonly performed surgery. It was performed in 86 patients followed by skin graft which was performed in 71 patients. Amputation was done for 16 patients. The last performed procedure was fasciotomy which was done for 4 patients.

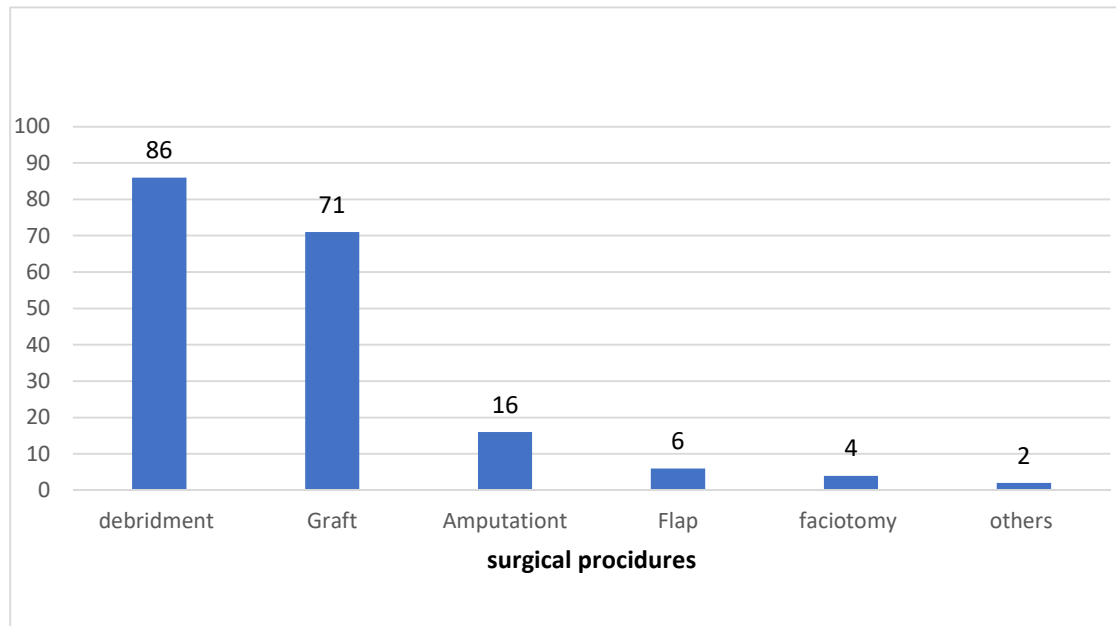


Fig 4. The distribution of surgical procedures done for all burn patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018.

4.16 Outcome

The overall mortality in this study was 5.9%. The major cause of death in this study is septicemia Which is 63.6% followed by respiratory failure (27.2%). From all subject 63.6 % of patients recovered without disability. And 8.6% had disability.

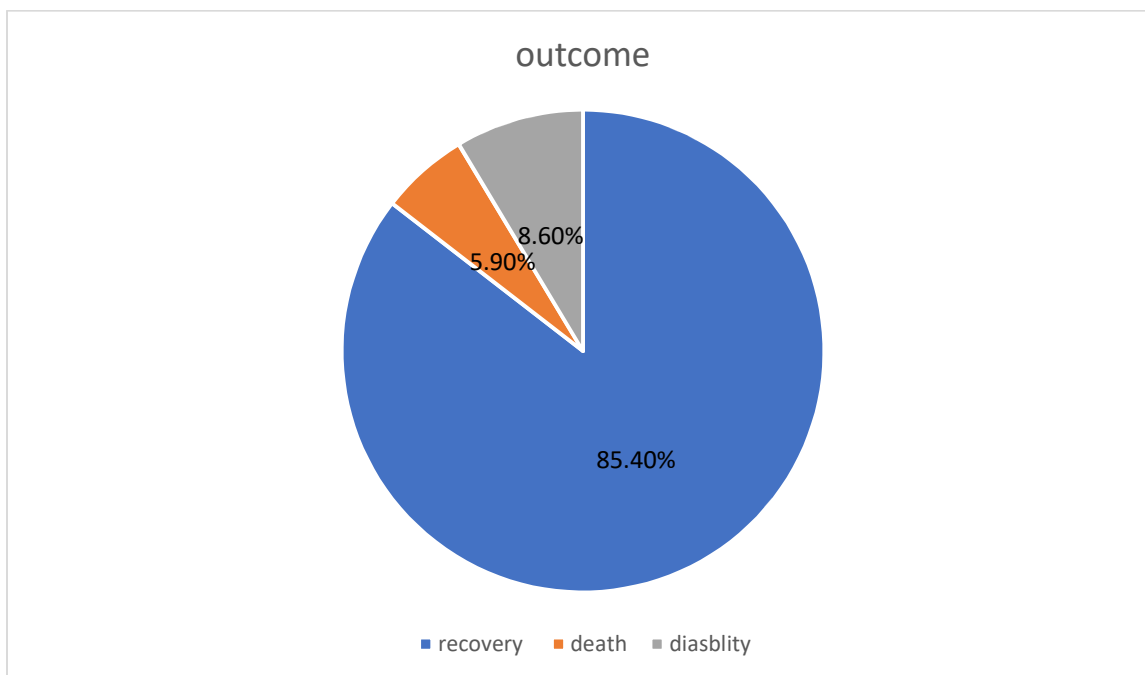


Fig. 5 Outcome of all patients admitted to AaBET hospital burn unit from August 1 2016 to January 31st 2018

5. DISCUSSION

Burn injury has major impact on the victims as individual as well as the community. This injury affects the victims physically, psychologically and also economically. African countries have the major burden of global morbidity and mortality of burn injury. Even though the burden of burn injury is high in Ethiopia few burn centers are available in the country which are located only in the big cities. Epidemiological studies are important to show the magnitude of burn injury and to establish burn preventive and management programs.

The current study revealed children less than 9 years as the group most prone to burn injury. Most studies also have paediatrics predominant results. The most prevalence of burn was in the 0-6 age group. (16) Children aged 2–5 and working-age adult were the most commonly treated. (15) There were 203 burnt children with an average age of 3 years (range 6 months to 12 years) (21). Burn had the highest incidence among children less than 5 years old (4.8%). (24) The high prevalence rate of children with burn injuries could be attributed to a lack of or inadequate supervision by caretakers, and their lack of understanding of harmful nature of fire or hot objects.

This study shows predominance of female patients (54.1%) in comparison to male patients. Which is similar to the One-year cross sectional study was conducted on the Epidemiology and Outcome of Burn Injuries in Sri Dr. Prabhakar Kore Hospital and Medical research centre in India. (13) This research shows more than 50% of the patients were females (52.63%) and 10% were pregnant at the time of burn injury. A retrospective analysis of the burn injury from patients records in the emergency department, was done in Turkey female 124 (53.9) male 106 (46.1). (16) The study done in Nepal also has similar result with our study this study shows predominance of female patients (54%) in comparison to male patients. (17) All the burn injuries that occurred in the 10 to 14-year-old children were seen among girls. (24) Male predominance was seen in a population-based study of the epidemiology of acute adult burn injury was conducted in Calgary Canada a total of 928 burn-injured patients were identified 70.9% were male. (14) The spectrum and outcome of burns at a regional hospital in south Africa shows a

total of 450 patients were admitted two hundred and thirty-five were male. (21) The main cause of female predominance may be due to Ethiopian females are responsible for cooking and they spend most of their time in the indoor activities like cooking food than males. The predominance in male child in some studies may be due to more mobility of male sex compared to females

Among 185 patients 149 patients got injured at home. In other studies, majority of burn injuries occurred at home. (17, 18, 19, 21,24) This could be due to risk groups like children and females spend their time at home so they are predisposed to home cooking fire as well as hot food and beverage.

The most common cause of burn admission was scalding. (48.1%)A literature review showed that the majority of burn causes was same as this study scald burn (17,15,16,18,19,22,23,24). This may be due to specially in children their underdeveloped motor to hold and handle hot liquids or solids. The second most common cause of burn injury is flame burn in this study. Some studies show flame burn as the commonest burn. (13, 21) In Ethiopia the fuel wood is used to cook on an open fire in traditional way this can also be attributed to the risk for flame burn injuries.

Epilepsy was found in 15 patients 4 patients with diabetics and no psychiatric patient was found in this study. Allepileptic patients sustained burn injury during a seizure attack, all of them are known epileptic patients who discontinue their medications. This might be due to some of them associate epilepsy as a curse from God or evil sprite so they tend to use traditional medications and holy water and discontinue their antiepileptic drugs.

Only 17 patients mentioned use of cold water as a first aid measure in this study. In other study many people (36%) used harmful substances with deleterious consequences as first aid measure for burn. Only 13.5% mentioned use of cold water as a first aid measure and none recommended covering the burn wound with clean piece of cloth. More than one third of the population use urine, mud, herbs and other deleterious substances as first aid treatment. (24) In this study there were no burn victim who used urine or mud as first aid measure but there were 4 patients who used oil as pre-hospital intervention. In order to avoid the use of this harmful substance health education about proper first aid for burn injuries should be given for the community.

From this study the median length of hospital stay was 29 days which is shorter than from a study done in burn unit of Yekatit 12 hospital the overall median hospital stay was 44 days. (23) From a study done at burn center in Ghana highest mean length of stay was 9.7 days. (4) Also, from a study done in south Africa hospital stay averaged 68 days (3.5 days per percent burn: range 1–161 days). (2) The result of this study shows longer hospital stay than a study done in Nepal, most of the patients (63%) stayed in hospital up to 20 days in a study done in Nepal. (16) This could be due to larger TBSA%, higher depth of burn and increased rate of wound infection.

From all admitted patients 38.9% of patients have a TBSA% of 11-30% which is similar to a study done in Indonesia which shows a large number of pediatrics (37.7%) and adult (41.9%) had

a TBSA% of 11-30%. (22) In another study from all admitted patients 42.2 % of patients have TBSA of 11-20%. The mean% TBSA for the current study was 12.5% which is lower than from Yekatit 12 hospital study that shows the average mean total body surface area (TBSA%) burnt was 17.1 %. (23) TBSA is a major predictor of management and outcome of burn injuries.

A burn injury, depending on the severity, may require the patient to undergo a series of surgical procedures, such as excision and grafting. In this study the most commonly performed procedure was debridement which was done in 37.3 % of patients followed by graft. This is similar to a study done in Indonesia. (22)

The most common complication was wound infection which occurred in 7.6% of patients. This could be due to malnutrition, delayed presentation of patients to the health facility, poor wound handling as well as antibiotics resistance.

The overall all mortality rate was 5.9% which is higher than the mortality reported in a retrospective data analysis performed on all hospitalized patients to the burn center at the Chinghai hospital which was 1.8%. (15) This result is also higher than the mortality reported from cross sectional survey done on epidemiology of burn injuries in Mekele town the mortality was 1%. (24) The mortality in this study was lower than the mortality reported from the study on the spectrum and outcome of burns at a regional hospital in south Africa which was 9%. (21) The result of this study is significantly lower than the result of a study done in Indonesia this report shows the overall mortality rate of 24%. The most common cause of death in this study is septicemia followed by respiratory failure secondary to hospital acquired pneumonia. In this study post burn disability was 8.6%.

7. CONCLUSION

Children less than 9 years of age had the highest proportion of patients. Most of the injuries were anatomically confined to the upper extremities. The most common cause of burn was exposure to scald followed by flame and majority occur at home. The mean TBSA was 12.5% and the majority of the burns were second degree. The most common co-morbid illness is epilepsy (8.1%). The median length of stay is 29 days and the most common complication was wound infection. Majority of patients did not receive pre-hospital interventions; some patients use oil as pre-hospital intervention. The most common associated injury is fracture. The mortality was 5.9% and common cause of death was septicaemia and septic shock.

8. RECOMMENDATION

Burn injuries are common public health problem in our county which needs a community-based education program. In this study, burn frequently occurs in children. In order to reduce this burden awareness should be created in the parents and caregivers about how to prevent burn injuries in their children.

Health education should be given on harmful practices like applying oil or other herbal things that contaminate burn wound.

Apart from children and female sex epileptic patients are other high-risk group for burn injuries. This group of people should be advised and encouraged to have adherence to their antiepileptic medications and to have strict follow up.

In order to rehabilitate post-burn disabled patients a well organised rehabilitation center should be established.

Burn injuries have major financial burden in the patients as well as for the country so in addition to prevention attention should be given to the treatment. Additional burn centers should be available in the county to provide immediate treatment and prevent complications due to referrals to hospitals far from their home town.

Further studies are needed to be done on magnitude, cause clinical presentation and outcome of burn injury.

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Annex

Data collection sheet for burn patients in AaBET hospital burn unit

I Socio demographic data of the patient. 1. Age____ 2. sex____

II Clinical data

1. Cause of burn trauma A. Scald B. Flame C. Electricity D. Chemical agent E. Others
2. Place of injury or setting of injury: A. home B. school C. work place D. others (specify).....
3. Anatomic location/s of the burn
A. upper extremities B. lower extremities B. trunk D. head E. abdomen F. perineum F. face & neck
4. Degree or severity of burn injury
A. superficial/first degree burn B. partial thickness/second degree burn C. full thickness/third degree burn
5. Extent of burn injury (% of total burn surface area) _____
6. Duration of time before getting medical attention after burn injury _____
7. Pre-hospital intervention provided A. yes B. no
8. If the answer to question number 7 is yes, what was the care provided before hospitalization _____
9. Length of hospital stays _____
10. Is the injury intentional or non-intentional _____
11. Any concomitant medical condition of the patient
A. epilepsy b. diabetic mellitus C. Psychiatric disorders D. others (specify) -----E) none
12. Clinical presentation at the time of admission A. airway compromise B. Shock C. Compartment syndrome D. loss of consciousness E. Burned skin F. Infected wound G. contracture
13. Associated injuries A. Fracture B. Abdominal trauma C. TBI D. Chest injury E. Others

14. Complication A.HAI B. AKI C. arrhythmia .D.disability E .contracture F. wound infection G. sepsis H. none

15. Outcome of patient who had sustained a burn injury A. recovery B. Death. Disability