



**SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL
COLLEGE, DEPARTMENT OF SURGERY, PLASTIC AND
RECONSTRUCTIVE SURGERY UNIT**

**PATTERN OF CHILD BURN INJURIES AND THEIR OUTCOME AT
AaBET HOSPITAL**

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Abstract

Introduction: A burn is a skin and tissue damage caused by agents like fire, scald, electricity, chemical or radiation injury. Burn injury is a major global public health problem accompanied by a high risk of mortality and morbidity with over 310,000 annual deaths. Nearly 75% of burns in young children are due to scald burns. Infants have the highest death rates and large surface area of burn, inhalational injury, poverty, presence of sepsis imposes great factor for mortality and morbidity.

Objective: To assess pattern of presentation of paediatric burn injuries and their management outcome.

Methods: Hospital based cross-sectional study was used. Data was collected from patients chart and were cleaned, coded, checked for completeness and entered into SPSS version 25 for analysis. Descriptive statistics and logistic regression were used to analyze the data and graphical presentations were used to present the result findings.

Results: Of the 218 paediatric burn patients admitted to AaBET burn unit, 71.1% had sustained scald burn due to splash of hot water while 20.2% of the patients are admitted due to flame burn. 53.6% of the patients had a 2nd degree superficial burn with upper extremity and trunk being the most common sites of burn injury. Around 38.2% of the patients developed acute complication the most common being sepsis of wound focus. 30.7% of the patient had developed chronic complication most commonly post burn contracture. A 3.2% of the patients died while being managed. Larger number deaths were found in children < 5years and in a patients with Major Burns.

Conclusion & recommendation: The leading causes of burns in paediatric age group are scalds which are largely preventable. Children need due attention and care as they are easily exposed to burn injury when left alone at home especially in the kitchen.

Keywords: paediatric, outcome, major burn, complications.

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Tables of Content

Abstract.....	I
Acknowledgement	II
Lists of Tables and Figures	1
1. INTRODUCTION	1
1.1. Background	1
1.2 STATEMENT OF THE PROBLEM	3
1.3 SIGNIFICANCE OF THE STDUY	3
2. LITERATURE REVIEW	4
3. OBJECTIVES	8
3.1 GENERAL OBJECTIVES	8
3.2 SPECIFIC OBJECTIVES.....	8
4. METHODOLOGY	9
4.1 STUDY AREA	9
4.2 STUDY DESIGN.....	9
4.3 SOURCE POPULATION	9
4.4 STUDY POPULATION	9
4.5 ELIGIBILTY CRITERIA	10
4.6 Measurement variables	10
5. Results	14
6. Discussion.....	22
7. Limitations of the study	25
8. Conclusion	25
9. Recommendations	26

List of Abbreviations

WHO-----	World Health Organization
SPHMMC-----	Saint Paul Hospital Millennium Medical College
AaBET-----	Addis Abeba Burn, Emergency and Trauma centre
E.C-----	Ethiopian Calendar
G.C-----	Gregorian Calendar
TBSA-----	Total Body Surface Area
ETB-----	Ethiopian Birr
LMIC-----	Low- and Middle-Income Countries
RL-----	Ringer Lactate
I/D-----	Irrigation and debridement
STSG-----	Split Thickness Skin Graft
PBC-----	Post Burn Contracture
DVT-----	Deep Venous Thrombosis
GI-----	Gastro-intestinal
AKI-----	Acute Kidney Injury
NG-tube-----	Naso-Gastric Tube
ABA-----	American Burn Association

Lists of Tables and Figures

Figure 1.Frequency of burn within age category	14
Figure 3. Frequency distribution of TBSA	16
Figure 4. Frequency of Each depth of burn within specific causes of burn	17
Figure 5.Depth of injury in Epileptic patients.....	18
Figure 6. Patient outcome within age category.....	21
Figure 7. Number of death within TBSA category	21
Table 1.Frequency distribution of causes of burn	15
Table 2.Frequency distribution of depth of burn	16

1. INTRODUCTION

1.1. Background

A burn is a skin and tissue damage caused by agents like fire, scald, electricity, chemical or radiation injury. Burn injury is a major global public health problem accompanied by a high risk of mortality and morbidity(1). The World Health Organization (WHO) estimates that the annual death due to burns is over 310,000, and low and middle income countries accounts for 95% of all annual burn deaths(2).

Globally, nearly 96,000 children under the age of 20 were fatally injured as a result of a fire-related burn of which majorities of injuries occur in low- and middle-income countries. The majority of burns to young children occur as accidents in the home environment usually from scalds which are mainly from hot water and other heated liquids. Contact burns from household appliances such as oven doors, hot irons and wood stoves are also common(2).

In sub-Saharan Africa, it is estimated that between 18,000 and 30,000 children under the age of 18 died annually as a result of burn-related injuries. These injuries were rated as the second most common cause of accidental death among African children younger than 5 years of age(3). Burn injuries are very common in developing countries. Burn victims typically come from poor families in rural regions, where fires are necessary for daily living and primary care is practically nonexistent(4).

The high incidence of burn injuries in children is attributable to children's impulsiveness, lack of awareness, higher activity levels, natural curiosity, and total dependency on their caregiver. Burns in children differ in multiple aspects from adults and may result in more severe devastating injuries. These injuries include, acute life-threatening complications (Fluid loss, airway obstruction, renal failure, Super-infection) and chronic complications (significant disfigurement, disability and Psychological trauma)(5). Additionally, Burns account for the greatest length of stay of all paediatric hospital admission injuries and the management of

paediatric burns remains complicated, challenging and extremely costly even in well-equipped and modern burn units(6).

Children have a relatively thinner dermis, so any given thermal insult will sustain a deeper burn than the adult. The epidemiological patterns of burns vary significantly based on age, sex, economic status, local customs, social, and environmental circumstances. Smoke inhalation is strongly associated with mortality, despite improvements in the care of burns.(6)

Infants have the highest death rates, while those aged between 10 and 14 years have the lowest. The death rate climbs again for 15–19 year olds. Burns are the only type of unintentional injury where females have a higher rate of injury than males. The fire-related death rate for girls worldwide is 4.9 per 100,000 population versus 3.0 per 100 000 for boys.(7)

Burn can be assessed using the estimate of the depth, and total body surface area burned (TBSA). Additionally, burns are classified as superficial, partial, and full-thickness, depending on the depth of injury to the skin. Furthermore, it can vary from mild to major, depending on the total body surface area burned (TBSA), depth, and location of the burn.

Researches in the epidemiology of burn injury in many developed and high-income countries made a great contribution for the primary and secondary prevention of fires and burns(8). Unfortunately, many developing countries with a significant incidence of burns do not have adequate data for epidemiological analysis including Ethiopia. So this study is aimed to assess the pattern of presentation of child burns and their management outcomes of paediatric burn at AaBET burn unit over the past four years.

1.2 STATEMENT OF THE PROBLEM

Burn injuries are among the most devastating of all injuries and a major global public health problem. Burn injury is a global health threat accompanied by a high risk of mortality and morbidity. Globally, nearly 96,000 children under the age of 20 were fatally injured as a result of a fire-related burn(2). Burns which occur in low to middle income countries generally lack the necessary infrastructure to reduce the incidence and severity of burns(4). A sufficient knowledge of the epidemiological characteristics of burns is necessary for their prevention. Sustained research and study on the epidemiology of burns in many developed and high-income countries such as the United States has made a great contribution to primary and secondary prevention of fires and accidental burn(8). Burn injuries are largely considered as being preventable. However, one needs to know the patterns and causes of burn injuries if intervention measures are to be effective.

1.3 SIGNIFICANCE OF THE STUDY

Since children are the windows of hope for the future development and existence of a country, it is a great deal to concern about their health and safety. It is very crucial for every burn institution to know the specific pattern, cause and management outcome of burn injuries for appropriate treatment and prevention of burn injuries. In the developing countries like ours, there is a wide gap between the number of burn patients and available resources to manage them. Because of limited availability of specialized burn unit we have not been able to lower the burn related deaths as compared to the western world. Very little is known about the patterns and clinical presentation of burn injuries in Ethiopia. This study will determine the presentation and management outcomes of paediatric burn injuries, which are the prerequisite for planning preventive measures and improving the effectiveness of services delivered by burn care facilities.

2. LITERATURE REVIEW

Burn is a trauma where tissue damage is brought on by heat, chemicals, electricity, radiation or the sun. Burn injuries are amongst one of the most devastating of all injuries, having a great impact on the patients physically, socially, economically, physiologically and psychologically. Burns are still one of the top causes of death and disability in the world(1).

WHO reported that while fire causes the majority of burn-related deaths in children, scalds and contact burns are an important cause in overall morbidity from burns, and a significant cause of disability(2). Even in high-income countries, children under the age of five have the highest rate of hospitalization from burns, followed by 15–19-year-olds(8). Global estimates revealed that the highest number of paediatric burn admissions per capita is found on the African continent. WHO established that between 18,000 and 30,000 children aged 5 years or younger die annually of fire related injuries in sub-Saharan Africa(3).

The most frequent cause of burn injuries in children is found to be scald in many literatures (6). This might be due to children's attitude in playing (stay) at home or in the kitchen with their mother or guardians where drinks and liquid foods are being prepared. Toddlers were more affected by scald burn probably because children start to investigate their environment and learn walking by grabbing different equipment and vulnerable to injury when they are left unattended near hot fluids. Another known cause of paediatric burn is electrical, thermal, and chemical and radiation burns are among listed causes (9).

WHO found that mortality and morbidity from burns are strongly associated with poverty(2). Many studies also found strong determinant of burn outcome and nutritional status of the patients. It is also found that extent and depth of burn, presence of inhalational injury, age of the patient, early intervention, proper fluid resuscitation, pre-hospital intervention, duration of hospital stays are main determinants of burn outcome(10).

Burns are the only type of fatal injury that occurs more in low-income and middle-income countries in the Eastern Mediterranean, Western Pacific Regions and African countries. Numerous study conducted showed that poverty as main risk factors for paediatric burn. Socioeconomic factors that increase the risk of childhood burns include: low rate of literacy within the family; living in overcrowded dwellings or with cluttered areas in the home; failure to properly supervise children; a history of burns among siblings; and the absence of laws and regulations relating to building codes, smoke detectors and flammable clothing(11). Fireworks pose a significant risk for children, particularly adolescent boys. Fireworks have been banned in many high-income countries, but in most low- and middle-income countries, there are no laws restricting their use (4).

According to study done in Ondokuz Mayis University Samsun, School of Nursing, Turkey, it indicates that 18% of burn patients are children under 5, and the most common aetiology in this age group is scalds(12). Burd and Yuen reported that the highest incidence of hospitalised paediatric burn patients is in Africa and the lowest is in the Americas. Europe, the Middle East, and Asia show similar figures, but the considerably larger population of Asia indicates that it bears over half of the world's paediatric burn population. Studies showed that around 90% of burn occurs in LMIC with the highest incidence are in South East Asia(13). Children 0–5 years account for 50% of all burns in children in India(14).

According to study conducted in Israel, infants (ages 0–1) had the highest prevalence (45%). Scalds caused 68% of burns. Burn extent in 83% of the patients was less than 20% TBSA, 3% suffered 40%TBSA of burns.(15)

According to study done in The Hospital for Sick Children, Canada electrical injuries are main a worldwide problem, responsible for considerable morbidity and mortality(16).

Study done in North Carolina showed 10.7% of paediatric burn patients had epilepsy and flame burn is the most common cause in this group. Those epileptic patients who sustained burn injuries are found to have a deeper burn and longer hospital stay(11).

Study done in Australia showed that proper pain management in paediatric burn patients are found to have an association with faster wound healing , family and patient satisfaction and reduces PTSD.(17)

Numerous studies have been conducted and the result of their study showed that Africa as continent had a greater burden of paediatric burn and greater number of paediatric burn has been recorded in Africa. Study made at Red Cross Children's War Memorial Hospital and University of Cape Town, South Africa on Paediatric burn care in sub-Saharan Africa indicated about 70-85% of burn cases are known to happen among children less than 5 years, mostly happening in and around the house, and hot liquid is found to be the most common causative factors followed by flame burn(3). Another study was made at South Africa on paediatric burn injuries over a period of 15 years indicated that 80% of burn injuries occurred in children 0–4 years of age with around 90% of burn injuries occurred in or around the child's home. This study found scald injuries as the cause of burn in 74% of the cases followed by flame burn(13).

The study in Nigeria made over 289 paediatric burn over the period of 10 years indicates, paediatric burn constitutes 45.3% of all burn admission, of which 63.7% are found between 0-5 years, 21.1% between 6-10 years with scald burn being the commonest aetiology. Another study made in Nigeria showed that 88.6% of the paediatric burn injuries occurred at home and non-intentional causes were responsible for most (89.6%) of the cases(4).

Study made at southern and central Tunisia over a period of 1 year, in 2017, showed paediatric burn admission accounted for 35% of admission with 44.7% of the burn victims being under 4 years of age. This study also showed 64% of the patient's sustained burn to their upper limb. Another study conducted at this country also reported 61% of the burn occurred among boys as compared to 39% of girl victims with 95% of burn accident being happened at home. (18).

According to study done in 2014 G.C in Ethiopia at Yekatit 12 Hospital regarding Magnitude, Clinical Presentation, and Outcome of Paediatric burn injuries, it showed prevalence of paediatric burn injuries to be 6.4%, with children less than 3 years of age accounting for highest proportion/. Another same study done at Yekatit 12 Hospital showed that the most common causes of paediatric burn is found to be scald in 60% of all injuries and followed by flame burns at 32.9% and 80.1% of the victims had a burn extent of less than 20% TBSA(19).

Research was made at Felege Hiwot Referral Hospital in Bahir Dar town, Northern part of Ethiopia in 2017 G.C on prevalence of burn injuries among children and they found the prevalence was 0.46% which is higher among females comprising 62.7% and scald burn is found to be the most common accounting for 42.2 %(20).

Another study was made in Ethiopia on Management Outcome of Burn Injury and Associated Factors among Hospitalized Children at Ayder Referral Hospital, Tigray, 2020 G.C and it showed that scald burn accounts for 69.4% followed by flame burn which accounts for 17.3%/. The study showed 85% cases of scald burn occurred within the age group of 0-4yrs and 24.3% of patient who did not get fluid resuscitation were discharged with complications. Another study done at this Hospital showed that duration of presentation, extent of injury, length of stay, age, fluid resuscitation in 24 hours, and nutritional status of the patient were found to be statistically significant with burn outcome in paediatric age group(21).

Paediatric burn injuries are least explored areas among other injuries. Very little is known about the patterns and clinical presentation of burn injuries in Ethiopia. This study will determine the magnitude, clinical presentation and outcome of paediatric burn injuries, which are the prerequisite for planning preventive measures and improving the effectiveness of services delivered by burn care facilities.

3. OBJECTIVES

3.1 GENERAL OBJECTIVES

To assess clinical presentation and outcome of paediatric burn patients at AaBET hospital

3.2 SPECIFIC OBJECTIVES

To describe pattern of clinical presentation of child burn

To identify common causes of paediatric burn injuries

To analyze outcomes of paediatric burn injuries

4. METHODOLOGY

4.1 STUDY AREA

The study was conducted at Addis Ababa Burn, Emergency and Trauma (AaBET) Hospital, an affiliate of Saint Paul's Hospital Millennium Medical College. AaBET was inaugurated as a public trauma centre under SPHMMC, in 2016. It is located around 3km away from main SPHMMC. It is one of the first trauma centres with burn unit in the country reaching for over 12 million people from different parts of the country. The Hospital has more than 200 beds and 800 staffs. The hospital has Emergency Medicine, Orthopaedic Surgery, General surgery, Neurosurgery and Plastic and Reconstructive surgery Services with the burn unit being managed by the Plastic and Reconstructive Surgery Unit. AaBET burn has six admission wards with 20 beds. The hospital also trains undergraduate and postgraduates programs in different specialties.

4.2 STUDY DESIGN

A Hospital based cross sectional study was conducted from September 1, 2016- August 30, 2020 G.C

4.3 SOURCE POPULATION

Source population for this study was all paediatric burn patients admitted to AaBET burn unit between September1, 2016- August30, 2020 G.C

4.4 STUDY POPULATION

All patients less than 18 years of age that sustained burn injury and were admitted to AaBET burn unit during the study period.

4.5 ELIGIBILITY CRITERIA

4.5.1 Inclusion Criteria

All burn patients less than 18 years admitted to AaBET burn unit during study period

4.5.2 Exclusion Criteria

Incompletely documented cards and lost medical records

Patients transferred to other hospital and those patients who left against medical advice

4.6 Measurement variables

4.6.1 Dependent variables

- Management outcome

4.5.3 Independent variables

- Age
- Sex
- Causes of burn
- Depth of burn
- TBSA
- Inhalational injury
- Pre-hospital intervention
- Co morbid illness
- Wound sepsis
- Shock
- Resuscitation with crystalloid
- Surgical intervention

4.6.3 SAMPLE SIZE AND SAMPLING PROCEDURES

All paediatric burn patient admitted to AaBET burn unit during study period are included.

4.6 SAMPLING TECHNIQUES

All paediatric patients admitted to burn unit during study period were selected from burn admission and discharge log book and listed using their card number.

4.8 OPERATIONAL DEFINITIONS

Paediatric: all children less than 18 years old

Outcome: patient recovery with or without complication or death. The death was assessed for patients who died at burn unit while being managed.

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

Acute complications: Complication that develop during acute phase of burn (i.e. before expected time of burn wound epithelisation) due to systemic effect of burn

Chronic complications: complications that develops from abnormal burn wound healing

Major Burn: Those with > 10% TBSA according to American Burn Association guideline

4.9 DATA COLLECTORS AND DATA COLLECTING PROCESS

Data was collected by trained general practitioners (4 individuals) and supervised by principal investigator. The trained physicians were involved in data collection process using the data collection sheet. Burn patients admitted to burn unit of AaBET hospital during the study period were initially identified from burn unit log book. Paediatric burn patient admitted to burn units are identified based on their identified card number, and their chart records are retrieved from card room and all relevant information's were collected from their charts after taking legal permission from hospital administration. The collection started from Jan 22, 2021 G.C.

4.10 DATA COLLECTION INSTRUMENTS

An extraction format that contains study variables of interest were prepared in English language to extract relevant information about age, sex, address, clinical features, extent and depth of burn, intervention given, investigations, diagnosis on admission, co morbidities and final patient outcome. Data was collected on excel sheet. A computer was used for collected data as storage.

4.11 DATA QUALITY CONTROL MEASURES

Data collectors were trained and regular follow up was made. Content and quality of data collected daily supervised to ensure the quality of data. Improperly collected data's were refilled using inclusion criteria after communicating personally to data collectors. Pre-test was done on 5 % of records before the actual data collection started to make sure that the data collecting sheet is capable of yielding the required data for the study and some modifications were done according to the results found. The data's were collected from patient charts that were registered by ward physician. The data collection format was checked for its completeness and gaps identified were corrected immediately.

4.12 DATA PROCESSING AND ANALYSIS

After data collection, each questionnaire was given a unique code by the Investigator. Data was analyzed by SPSS version 25. Frequency distribution was done for appropriate variables. The generated data was compiled by frequency tables, charts, and graphs. Data was double entered to confirm cleanliness. Descriptive statistics and multiple logistic regression was used to analyze categorical variables and significance is set at P value of < 0.05.

4.13 ETHICAL CONSIDERATION

Ethical clearance was obtained from SPHMMC, Institutional Health Research Ethics Review Committee. Then, official letter for cooperation and permission was delivered to AaBET Hospital and to all responsible bodies to get permission for the study. Moreover, brief explanation was given to the hospital manager concerning the purpose of the study and the procedures used to collect the data. After getting permission, patient's charts that fulfilled the criteria were selected. Confidentiality of data collected was kept and names of the patients were not included during data collection.

4.14 DISSIMINATION OF THE RESULT

The finding of the study will be presented to the department of Surgery at SPHMMC and shared with AaBET Hospital, to other targeted health facilities. It will also be disseminated through presentations in different professional association meetings and annual conferences. Further attempt will be made to publish it on national and international scientific journals.

5. Results

A total of 544 patients had been admitted to AaBET burn unit from September 1, 2016-August 30, 2020 G.C. Among them 218 patients were in a paediatric age group.

Socio-demographic characteristics of the patients

Of 218 paediatric burn patient admitted, 120(55%) were from Addis Ababa, while 98(45%) came from different parts of country. The rest of the patients were referred from Amhara, Southern Nations, Nationalities, and Peoples' Region and other rural parts of Ethiopia. According to this study larger number of paediatric burn injury were seen in urban areas than rural areas of the country.

In this study 110(50.5%) of the paediatric burn victims were females while 108(49.5%) of the victims were males. Mean age of the children's was 1.5 years. Children ≤ 5 years accounts for largest proportion of the burn victims accounting for 67.9% paediatric burn injury. The number of children who sustained a burn injury decreases as their age increases. Female victims are dominant in those of < 5year age category. Fig.1 below shows distribution of paediatric burn by age and sex.

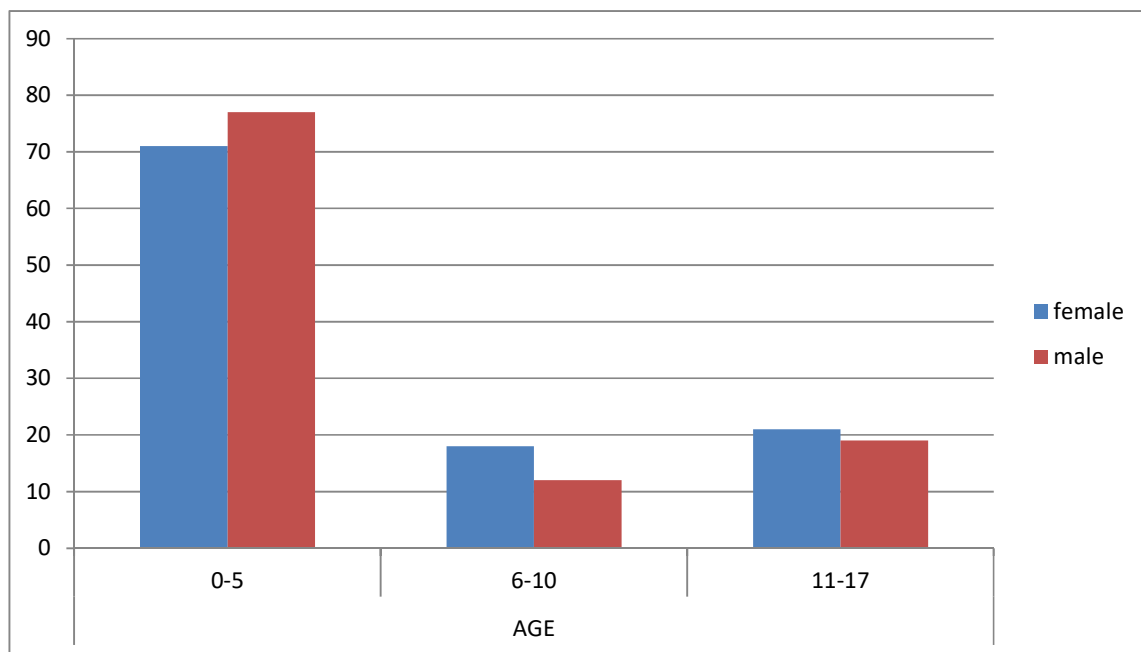


Figure 1. Frequency of pediatric burn within age category

Causes of burn injury

This study showed that the most frequent cause of burn in paediatric age group was scald burn which accounts for 71.1% (155) of the cases, followed by flame burn which accounts for 20.2% (44) of paediatric burn. Electrical burn accounts for 6.9% (15) of causes of burn. A 62.5% (136) of scald burn were due to splashing of hot water on the body. Children <5 years accounts for the largest number of scald injury, while in those 11-17 age groups, flame burn was found to be the commonest cause of burn.

Table 1. Causes of paediatric burn

Causes of burn	Number	Percent
Scald	155	71.1
Flame	44	20.2
Electric	15	6.9
Chemical	3	1.4
Contact	1	0.5
Total	218	100

Extent and Depth of Burn Injury

The study showed that majority of the patients sustained a burn injury involving >10% of total body surface area which accounts 56.9% (124). Only 34.9% (76) of patients sustained a burn injury of 5-10% TBSA. This study showed that most of the victims had a major burn as per ABA severity classification. A 57.3% (125) of the patients had developed superficial partial thickness burn, while 32.6% (73) had deep partial thickness burn. Only 8.3% (16) of patients had 3rd degree burn. This study showed majority of patients who sustained scald burn had superficial partial thickness burn. Majority of patients with flame burn had deep partial thickness burn while 3rd degree burn is dominant in those patients with electrical injury.

Table 2. Depth of paediatric burn injuries

Depth of Burn	Number	Percent
1st degree	1	0.5
2nd degree superficial	125	57.3
2nd degree deep	73	33.5
3rd degree	16	7.3
4th degree	3	1.4
Total	218	100

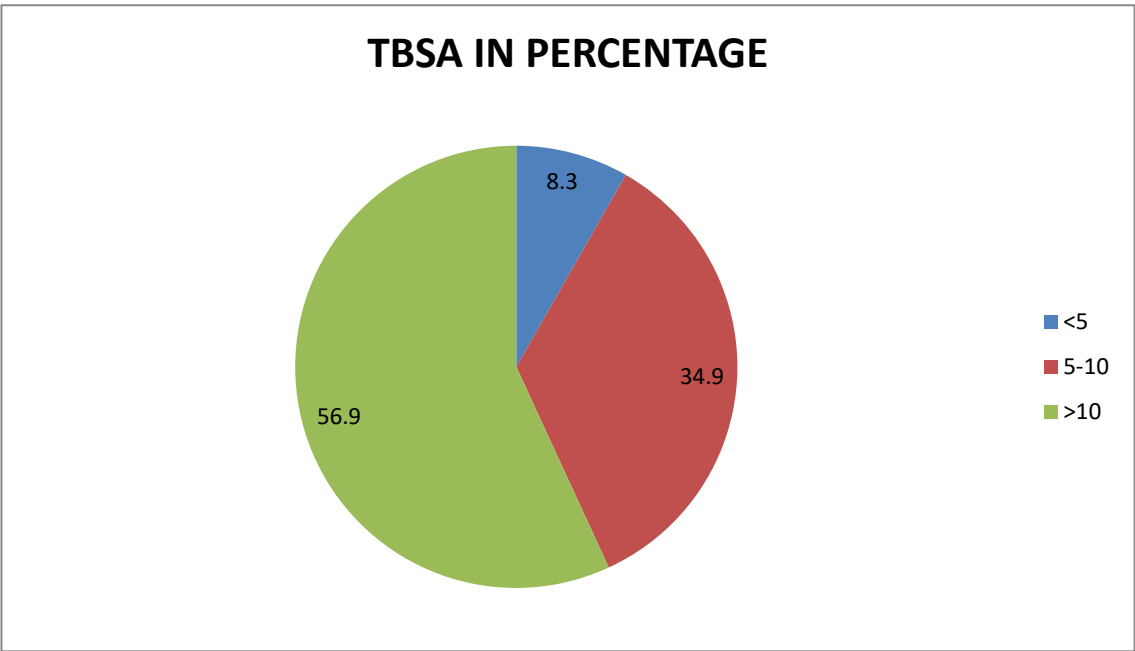


Figure 2. TBSA of paediatric burn

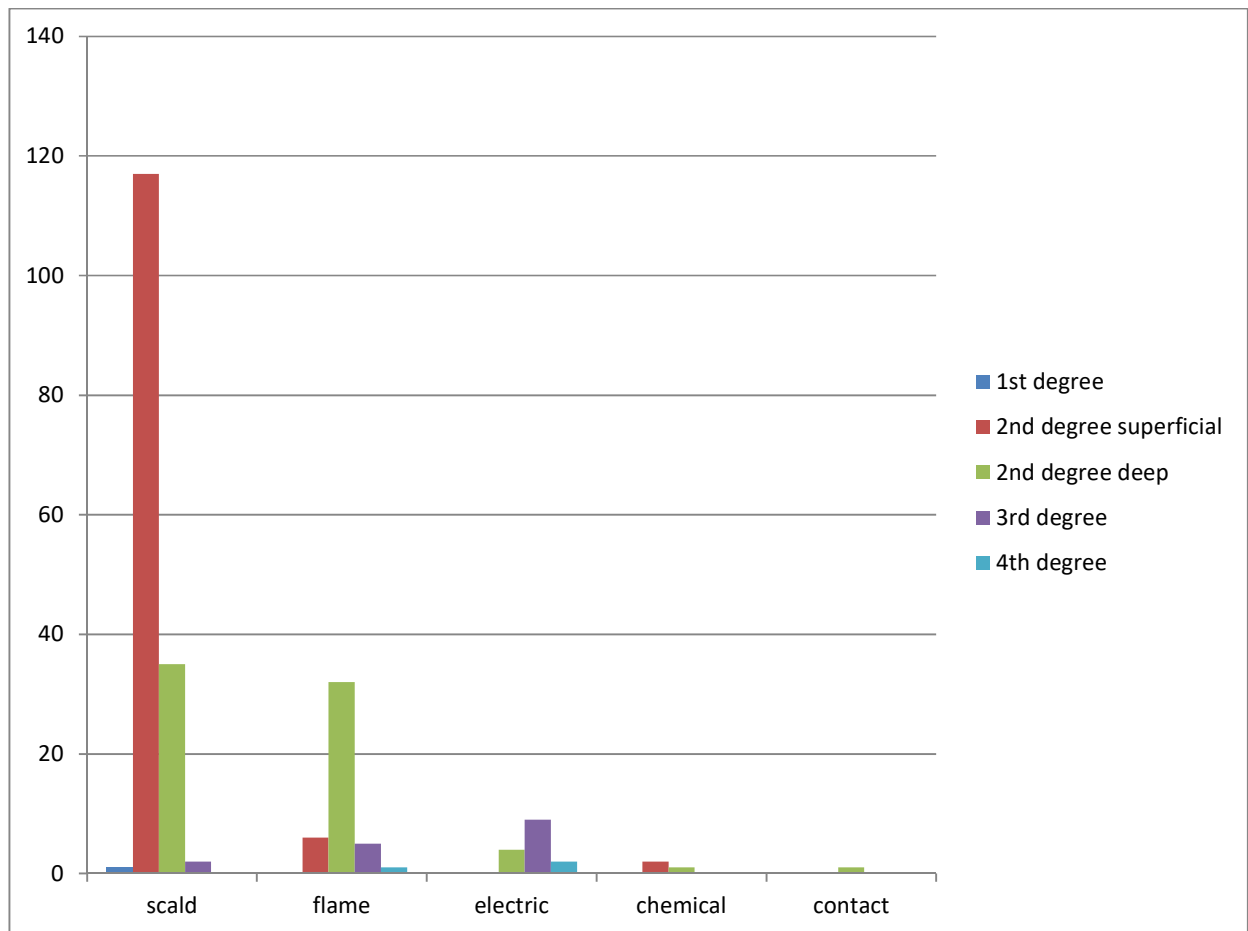


Figure 3. Depth of burn injuries with respect to causative agents

Duration of time before medical intervention

The study showed 48.7% of the patients seek health facility within the first 24hours after sustaining burn. Only 5 patients got pre hospital intervention whereby family applied cool water over burned part of the body.

Anatomic location of burn

According to this study 71.1% (155) of patients sustained burn injury involving upper extremity, while 56% (122) of the patients had burn to their trunks. Around 54.5% (118) had sustained burn to their lower extremity and very few of the victims had a burn involving perineum and genitalia. Most of the patient had burn injury to more than one anatomic site.

Co morbid Illnesses

Only 5.5% (12) of the patients had known co morbid illnesses. A 3.2 % (7) of the patients are known epileptic patients on follow up while the small group of patients had cerebral palsy and downs syndrome. All epileptic patients who sustained burn injury were found to have deep partial thickness burn.

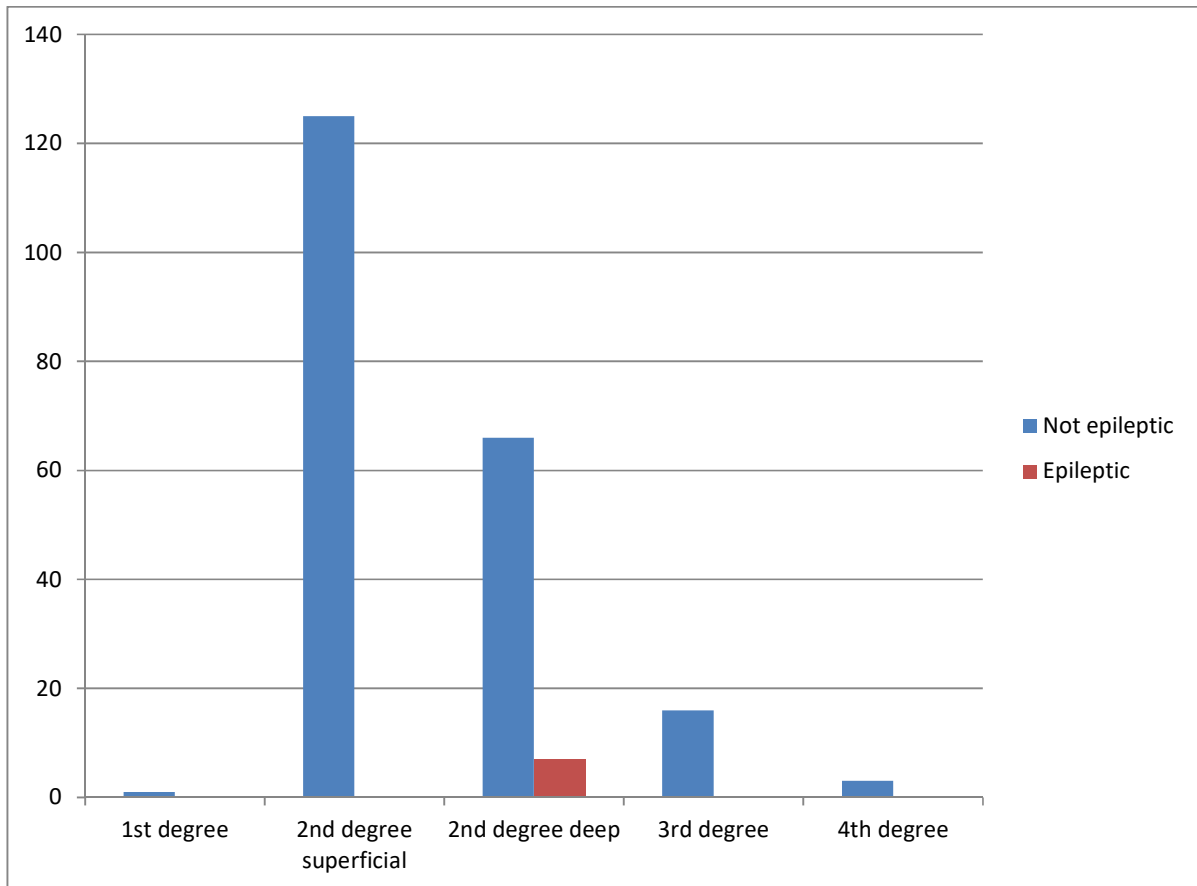


Figure 4. Depth of injury in Epileptic patients

Medical Interventions

This study shows all paediatric burn admitted to burn unit got wound care and analgesia. 66.5% (145) patients had been resuscitated with ringer lactate on initial arrival to AaBET emergency OPD. 67.4% (147) patients had been treated with systemic antibiotics while only 23.9% (52) of patients are diagnosed to have sepsis. GI- prophylaxis had been given to 40.8% (89) of patients while only 3.2% (7) of patients are given DVT prophylaxis. Almost all patients had been able to feed per-os by themselves while 1.4% of patients had been managed with NG-tube feeding.

Surgical intervention

The study showed that 37.6% (82) of patients were taken to operation theatre and irrigation and debridement was done. 37.6% (82) of the patients burn wound had been covered by split thickness skin graft. Around 1.4% (4) patients had been managed with flap coverage for burn defect. The study showed, around 14.7% of the patient developed post-burn contracture while only 3.7% (8) of the patients had been treated with contracture release. It is found that fasciotomy was done for 2.3% (5) of patients diagnosed to have compartment syndrome clinically.

Acute Complication

According to this study 38.2% (83) of patients had developed acute complications during acute phase of burn injury. Majority of the acute complications were found to be sepsis of different origin which accounts for 23.9% (52) of acute complications. The result revealed that 3.7% (8) of the patients had developed compartment syndrome, while 5% (11) of patients had some sort of electrolyte imbalance (mainly hyperkalemia). Two patients (0.9%) had been diagnosed with respiratory failure and they were put on mechanical ventilation. 2.8% (6) of patients had developed shock (hypovolemic and septic type) and 0.9% (2) of those patients had been managed with vasopressors. Most of the patients who were diagnosed with sepsis of different focus were found to have burn of >10% TBSA. All patients diagnosed with sepsis had been treated with IV antibiotics.

Chronic complications

This study showed that 30.7% (70) of the patient had developed at least one chronic complication. It was found that almost all patients developed skin colour change from hypo and/or hyper pigmentation from burn scar. Additionally 14.7% (32 patients) of patients developed post burn contracture. Additional 11.9% (26 patients) had functional loss from amputation and severe burn contracture. According to this study, bivariate logistic regression analysis of patients who ended up by amputation had significant association with electrical burn injury ($P=0.000$, $CI=95\%$). Around 4.1% (9 patients) of patients developed Hypertrophic scar. Large numbers of patients who developed hypertrophic scar are those who sustained initial burn injury to trunk and upper extremity on cross-tab analysis. Depth of burn, TBSA, age and sex has no significant association with hypertrophic scar up on logistic regression analysis. No patients had developed keloid.

Outcome

There were 7 deaths found during study period which accounts for 3.2% mortality rate. The study showed large number of deaths are found in children < 5years of age (5 out of 7 deaths) and those with major burn (>10% TBSA) (Fig.5). A multiple logistic regression was performed to ascertain the effect of age, presence of inhalational injury, sex, cause of burn, depth and extent of burn, presence of shock and sepsis, resuscitation with crystalloid on patients who ended up on death. There is no statistically significant association found.

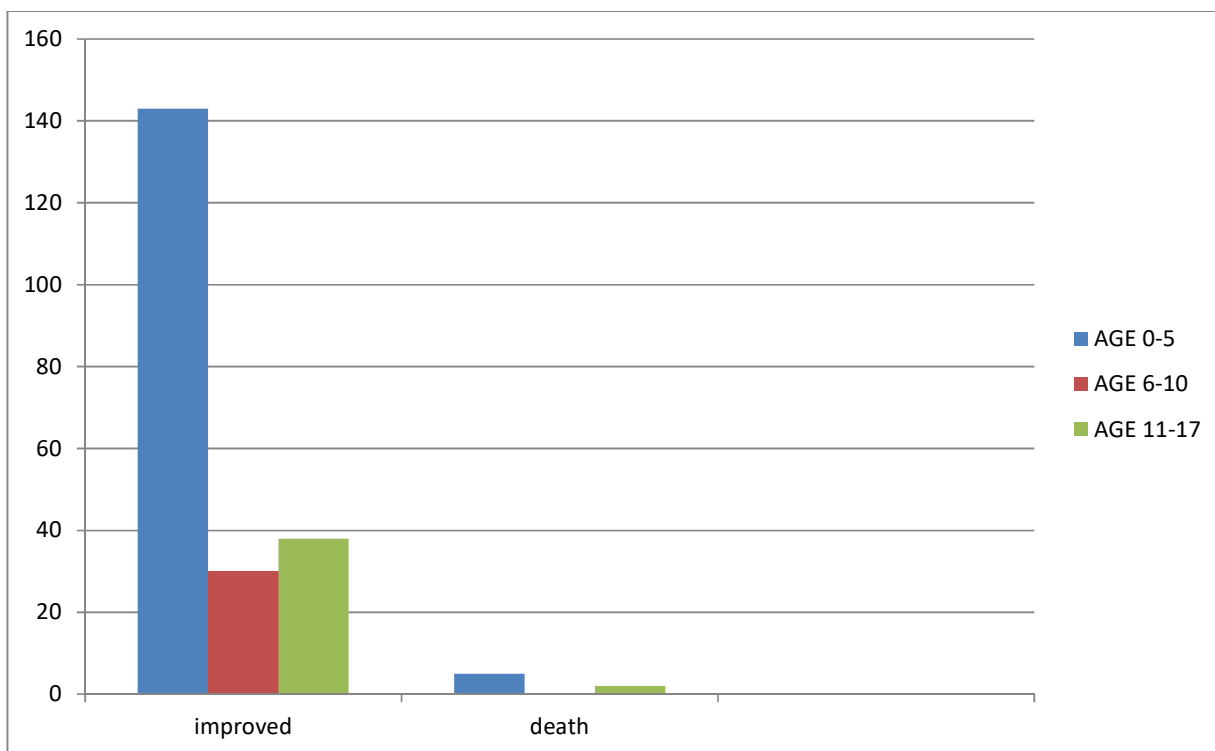


Figure 5. Patient outcome within age category

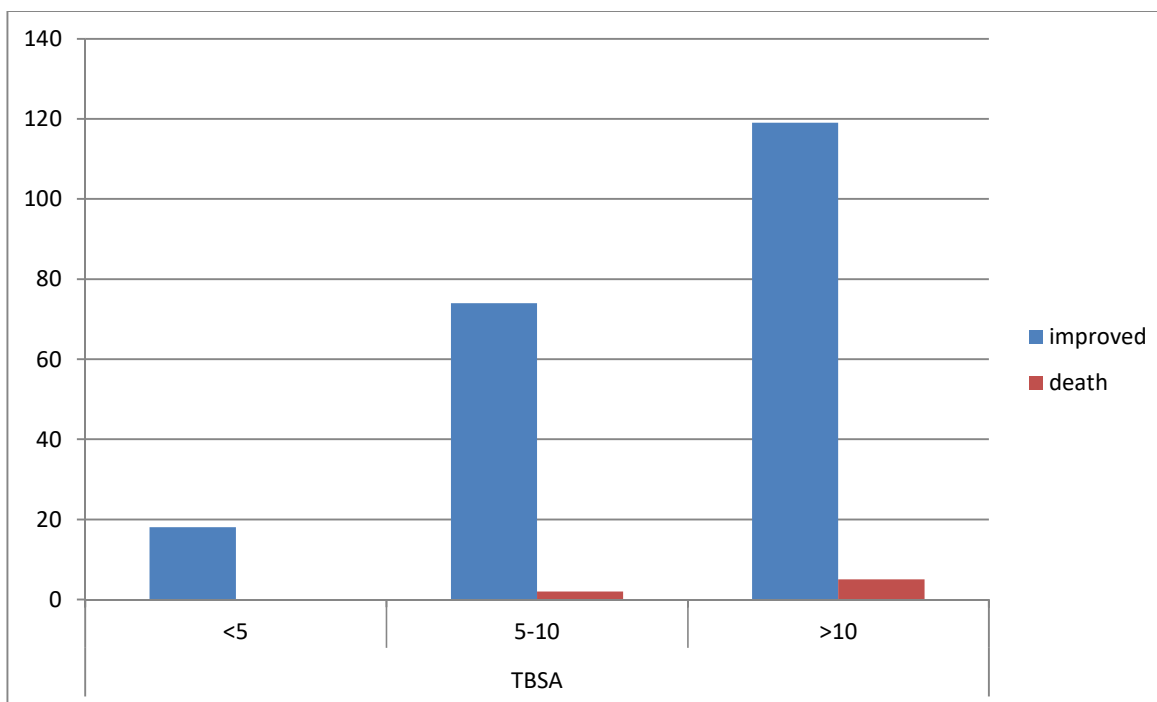


Figure 6. Number of death with respect to TBSA of burn

6. Discussion

Burn injury is one of the most devastating and disabling trauma to human being; it remains a serious threat to the well-being of the paediatric population and still has major cosmetic and functional consequences. It is one of the commonest causes of hospitalization in paediatric population.

Burns were frequently seen in preschool period and children aged between 0 and 5yrs. This study showed that highest proportions of burn injuries were seen between age 0 and 5 years which accounts for 67.9% paediatric burn. The study done at Red Cross Children's War Memorial Hospital and University of Cape Town, South Africa, shows comparable results showing children <5 years accounts for 75-80% paediatric burn injury(13). Similar study done at India also shows 50% of paediatric burn occurs in children < 5years(14). Study done at Ayder Referral Hospital, Tigray showed 64.1% paediatric burns happen in children <5yrs(21). WHO also reported that highest proportion of paediatric burn occur between 0 and 5years(2). This similarity may be due to the fact that children in this age group always want to discover their surroundings (environment) and more supervision is essential as the child gains locomotors and manipulative skills that are coupled with in satiable playing around the kitchen and lack of parental supervision which were leading predisposing factors for burns in children of this age group(20).

Various study showed scald as the leading cause of paediatric burn. Study done at yekatit 12 Hospital showed 60% of cause of paediatric burn to be scald(19). Similar study done at Ayder referral hospital showed 64.7% of cause paediatric burn to be scald injury(21). This study also shows that 71.1% of cause paediatric burn is scald burn. This can be explained by the fact that children especially toddlers and preschool children stay with their mothers or caregivers at home and would probably be left playing in the kitchen environment; as a result, they can get scalded by liquid foods being cooked by their parents or caregivers.

This study showed that 70.28% of patients had < 20% of TBSA of burn. This study is comparable to study done in Israel which shows around 83% of paediatric burn of <20 TBSA(15). The study done at Yekatit 12 Hospital also showed around 80.1 % of paediatric burn patients had < 20% TBSA of burn(19).

This study revealed that upper extremity is the commonest anatomy to be involved (71.1%). This finding was similar with a study conducted in Turkey in which 71.8% of the burns occur in the upper extremities(1). The study done at Felege-hiwot Hospital, Bahir dar also shows similar result where upper extremities are involved in 47.1% of cases(20). This can be explained by the fact that scald burns frequently occurred when children reached for a container of hot liquid while playing, by pulling a hot substance from either a cooking stove or a countertop. This could result in immersion or spilling of the hot substance on the children's extremities.

According to this study 69.3% of the patients were able to discharge without chronic complication. This result is comparable to study done at Ayder referral hospital where 82.7% discharged without complication while 17.3% were discharged with complication(21). Another study from South India indicated that 74% of children with burn were discharged with improvement(14). Another observation conducted in Nigeria showed that 70.1% cases were successfully managed without complication(4). This study showed majority of patients with electrical burn ended up with amputation of limb which mainly contributes to functional loss. Various studies showed similar finding that electrical burns causes more deeper burn which leads patients to more chronic complication from functional loss, cosmetic disturbance, prolonged hospital stay and the like.

This study showed only 3.2% of patients died during the study period. This finding is very low when compared to study done in Nigeria which showed 29.9% of death rate(4). Another study from South India indicated that 20% of the children died. A study done at yekatit hospital showed mortality to be 7.8 %(19). In Iranian study the mortality of paediatric burn patient was 5.6%(8). The low mortality rate in this study can be explained that burn patients during the first 24hours of emergency visit are being managed at an emergency OPD by emergency physicians. Again burn patients in critical conditions are not transferred to burn unit unless they are stabilized. So most of the deaths that happened at emergency OPD were not registered at Burn Unit log book and those patients kept at Emergency OPD were not being followed by burn team back in those days.

7. Limitations of the study

Since this research was a retrospective study, including other characteristics that could only be assessed by observation or history-taking was not possible. Some of the selected cards were lost. There were also incompletely recorded charts.

8. Conclusion

The most common causative agent of paediatric burn was scald, followed by flame. Children less than 5 years of age had the highest proportion of burn and the number of children who sustained a burn injury decreases as their age increases. Most of the injuries were confined to the upper extremities.

The mean TBSA was 5% and majority of the burns were superficial partial thickness burns. Majority of the paediatric burn patients were discharged without complication. The mortality was 3.2%, and inhalational injury was significant factor associated with death of paediatric burn patients.

Majority of patients had sustained burn injury to their upper extremities followed by trunk. Majority of patients who sustained electrical burn injuries had developed deep partial thickness burn. Paediatric burns who are epileptic had developed deeper burn as well. Majority of epileptic patients sustained flame burn injuries.

Finally, burn injuries are very common throughout the world and especially in the underdeveloped countries like ours where people frequently use traditional coal burning stoves and open fire cooking and in our setting availability and access to burn care facilities and proper treatment are limited.

Childhood burn continues to pose significant public health challenge especially in the low and middle income countries (LMIC) because majority of the burns are from preventable causes. Of equal importance are its associated high mortality, morbidity and long term disability in many of these countries.

9. Recommendations

- The leading causes of burn are hot water, milk, oil, and soup which are preventable. Playing and lack of parental care were leading predisposing factors for burns in children. Children should not be allowed in the kitchen and they should be kept in their beds or in their room while their mothers are doing housework's. Crawling children are especially at risk of burns since they move around the house. They should not be left unattended. It is also recommended to have separate cooking area from living area if possible.
- Health education should be delivered to parents and caretakers regarding the safe home environment
- school-based training programmes for children, may play an important role in the prevention of burn cases
- Proper early management and diagnosis of inhalational injury is needed from respective treating physicians
- Further studies are needed to assess proper implementation of management principle in handling paediatric burn and to assess factors affecting outcome of these patients.
- Concerted efforts must be made to reduce the incidence of burn injury, and the high mortality, morbidity and other long term disabilities through effective burn prevention campaigns and improvements in the care of the injured patients
- Rational uses of antibiotics should have to implemented in burn patients
- Epileptic patients should have to given better care and awareness regarding burn

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