

# Retrospective Study on Prevalence of Burn Injury among Children at St Francis Referral Hospital Morogoro Tanzania

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## Abstract

**Introduction:** Burn is an injury resulting from extreme temperature, chemicals or electricity. Fire-related burns are the most cause of death for children. Infants are at high risk consisting a global rate ranging from 3.0 to 4.9 deaths per 100 000 population.

**Methodology:** The study involved children aged between 2 to 9 years who were admitted due to burn injuries from January 2014 to December 2018. The hospital based study was conducted and data were collected by using medical records.

**Results:** The totals of 9125 were admitted during the period and surgical conditions accounted about 12% of total pediatric admissions. Among these 291 were enrolled with M: F 1.8:1. Scald was the common cause of burn in this population 213 (73%), children of 2years were the most affected group by 32.3% (94) and the mortality rate was 1.7%.

**Conclusion:** Majority of childhood burn injuries at this hospital are scald and most affected children with two years of age which give a needs of community based education of children and infant protection from burn injury.

## Keywords

Burn in Children• Scald• Domestic Activities• Mortality Rate• Disfiguring• Disability

## Introduction

Burn injury may be defined as an injury to the tissue caused by heat, chemicals, electricity, cold, radiation or contact friction. Fire-related burns are the eleventh cause of death for under ten years. Thermal burns are the fifth leading cause of deaths in the US that occur at home, third leading cause of accidental injury-related fatalities in under five and adolescents. Infants are at high risk for death from burns injury, while the total in children consists a global rate ranging from 3.0 to 4.9 deaths per 100 000 population [1].

The survivors live with varying degree of disability and psychological effects. Burn-related deaths show regional variation on which most of the deaths occur in poorer countries of Africa, South-East Asia and the low- income and middle-income countries of the Eastern Mediterranean while the low death rates are in American and

European societies. The recent evidence of national mortality rate is associated with cultural and socio-economic status of patients. Burn injuries are currently the fifth cause of death in the United States (US) which are domestic in nature, and third leading cause of unintentional fatality injury among children and adolescents [2].

The estimation of burn injury in under 18 years in sub-Saharan Africa is between 18,000 and 30,000 children annually as a result of burn-related injuries. In Rwanda, Burn is the second cause of injury in children. In Tanzania, burn injury in children urban area approximately 25% to 55% and most of them occur at home during domestic activities [3].

Burn injury in children is associated with life threatening complications, disfiguring disability and increased Length of Hospitalization (LOH).

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**Date of Submission:** 02 December, 2021, Manuscript No. jcre-21-42273; **Editor assigned:** 04 December, 2021, PreQC No. P-42273; **Reviewed:** 08 August, 2022, QC No. Q-42273; **Revised:** 16 August, 2022, Manuscript No. R-42273; **Published:** 22 September, 2022, DOI: 10.37421/2795-6172.2022.6.170

Low mortality rates due to burns in High-Income Countries (HIC) may be attributed to advanced and equipped burn units and Intensive Care Units (ICU trained critical care specialists and nurses plus advanced preventive measures. Disfigurement and disability that lead to stigma and rejection by the society also has been increasing throughout the treatment phase. St Francis is among few private hospitals having semi- tertiary capability to provide specialized health care. Unfortunately there is no data available not only in these private hospitals but also in public centers, instead; the researchers have been focused on communicable diseases like Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome (HIV/AIDS) and malaria. So, this study aimed to assess the epidemiology of burn injury among children's attended SFRH from January 2014 to December 2018.

## Materials and Methods

### Study area

The study was conducted at Saint. Francis Referral Hospital (SFRH). The hospital is located at Ifakara in Morogoro region in Tanzania. The hospital serves as a referral facility for patients from six districts which are Kilombero, Malinyi and Ulanga and neighboring areas like Mvomero and Mikumi and Kilosa [4]. The hospital offers semi-tertiary specialized care for about 1 17,000 patients per year.

### Study design and study population

A retrospective study was conducted whereby; data from January 2014 to December 2018 was used concerning burn admissions. The study included all children aged between 2 to 9 years admitted at St. Francis Referral Hospital with burn injuries between the study periods. Data regarding age, sex, etiology, Total Body Surface Area (TBSA), season, duration of hospitalization and treatment outcome from the medical records system and individual file was used [5].

### Sampling technique

This study involved five-year period; in this study the purposive sampling technique was used to extract all cases related to burn injuries. Children aged between 2 to 9 years admitted to the ward with burn injuries from January 2014 to December 2018 were included. Treatment outcome at discharge (alive or dead) and the average length of hospital stay were included children aged bellow 2years or above 9 years, incomplete medical records were excluded.

### Data analysis, data management and interpretation

The obtained data were entered in Statistical Package for Social Sciences (SPSS) version 20. The percentages and frequencies were reported for categorical variables whereby the means and standard deviations were used to report continuous variables; Logistic regression was used to determine the statistical association of outcome with other variables. The inferential statistics were considered significant at p value level of less than 0.05 [6].

## RESULTS

During the study period there were 9125 pediatric admissions, among these, there were 1087 surgical conditions accounting about 12% of total pediatric admissions. Among 1087 surgical patients, burn was the second diagnosis 291 (26.8%) to femoral fractures which accounted 45.5% (494). Among burn pediatric patients, the males were 187 and 104 females making M: F 1.8:1. The majority was from rural areas as shown in Table 1: below (Table 1).

Category	Variable	Frequency (N)	Percentage (%)
Sex	Female	104	36.7
	male	187	64.3
Residence			
	Urban	126	43.3
	Rural	165	56.7

**Table 1.** Distribution of the patients according to demographic characteristics.

Most of the patients affected were of two year in which 94 (32.3%) and among of them, 73 (25.1%) cases were due to scald burn. However, age was statistically significant with P value 0.01 [7]. In short, scald contributed a wide range of cause of burn injury in this study as it is shown in the Table 2 bellow (Table 2).

Age (yrs)	Scald N (%)	Contact N (%)	Fire N (%)	Electricity N (%)	Flame N (%)	Total N (%)
2	73 ( 25.1)	10 ( 3.44)	8 ( 2.75)	0	3 ( 1.31)	94 ( 32.3)
3	33 (11.34)	3 ( 1.31)	8 ( 2.75)	1 ( 0.34)	2 ( 0.69)	47 (16.15)
4	37 (12.71)	10 ( 3.44)	3 ( 1.31)	0	6 (2.1)	56 (19.24)
5	21 ( 7.22)	3 ( 1.31)	4 ( 1.37)	0	2 ( 0.69)	30 (10.31)
6	23 (7.90)	0	4 ( 1.37)	0	0	27 (9.28)
7	16 ( 5.5)	0	2 ( 0.69)	0	0	18 (6.19)
8	9 (3.1)	0	2 ( 0.69)	0	0	11 (3.78)
9	4 ( 1.37)	2 ( 0.69)	0	1 ( 0.34)	1 (0.34)	8 (2.75)
Total	216 (74.23)	28 ( 9.62)	31 ( 10.65)	2 ( 0.69)	14 ( 4.81)	291 (100)
Chi Square (X <sup>2</sup> ) = 39.1						
P-value = 0.01.						

**Table 2.** The distribution patients according to the age in relation to etiology.

In the study period, the author observed that, most of patients had Body Surface Area (BSA) was ranging from 5% to 40%. However, 11%-15% BSA range was the most presented accounting 37.5% while the least was between 36-40% BSA who accounted 0.7% (Table 3).

TBSA(%)	Frequency (N)	Percent (%)
44474	91	31.3
42309	109	37.5
16-20	27	33.3
21-25	3	1.03
26-30	1	0.3
31-35	5	1.72
36-40	2	0.7

**Table 3:** Distribution of the patients according to TBSA.

In logistic regression showed the age to be statistically significant (OR= 4.811; 95% CI 0.148-0.898; P-Value=0.028) while sex, residence, cause and TBSA were statistically not significant as shown in Table 4 below (Table 4).

Variables	Adjusted OR	95% CI	P-Value
Age	4.811	0.148- 0.898	0.028
Sex	8.44	0.372-10.178	0.43
Residence	0.837	0.124-3.301	0.594
Cause	0.926	0.121-4.568	0.749
TBSA	0.43	0.302-1.628	0.409

**Table 4.** Logistic regression analysis of statistical significance.

## Discussion

The prevalence burns accounted for a significant proportion of admissions, and this seems to have been more or less the same over the five years. Results showed the children of two years to have a higher percentage of burn admissions 94 (32.3%) becoming in agreement with other studies done elsewhere [8]. High prevalence of burns occurring in this age group indicate the nature of children during this growth period of life which exposes them to burns more often than any other age groups. In this growth period the child is active to lean and explore his environment but unable to recognize dangers and hazards. Since African women are busy with other domestic activities and most probably limited education on how to protect and supervise this group of population from hazard environment which lead to less protection of this group from burn injury [9].

However the study is in contrast with what was reported on which his study reported Nil prevalence in under ten years, but also the study differ from Gessesse and Yitayew , whose study reported high prevalence 33.3% in the years between 7-13year group. This variation may be attributed by differences in inclusion criteria or presence of modernized burn prevention techniques at homes in High Income Countries (HIC) [10].

This study has shown male are more affected with burn injuries (64.3%) compare to female (36.7%). Majority of children sustaining burn injuries are boys with a male to female ratio of about 1:8:1. The observation of male predominance was similar with other studies which coincides with this observation [11]. However, the findings

differ in which report similarity in sex distribution statistically, while it is reported that young female to be more affected by 64.91%. The diversity of gender distribution in various studies may be attributed by differences in inclusion characteristics in these studies.

Also the study done in Morogoro, it has found most children come from rural areas compared to urban area 56.7%. This may be due to poor socio-economic status, low education; most of the caretakers in rural areas possibly spend more time in agricultural and doing pet business so as to sustain the family needs [12]. Through giving education about injuries that may happen to their kids and raise awareness to those circumstances may help to reduce the morbidity and mortality associated with burn injuries.

This study has shown scald burn as the most common cause of burn injuries among children Scald 216 (74.23%) while the Electricity (0.7%) was the least cause of burn injury in this population. This finding concurs with other studies which report scalds as the leading cause of burn in children [13]. This indicate the association of burn in children in relationship with domestic activities since the primary etiology is from hot water, porridge, tea and milk on which the injury is attributed by absence of cognitive ability in this age group. At this age, they develop intellectual ability characterized by the tendency to reach the objects around him/her resulting into injuries. Also cooking methods at ground levels at homes on addition to ignorance on infant supervision of the mothers/caretakers while cooking, all put this population at risk of coming onto open fire or hot fluids. Electric and chemical burn injuries among children are less most which may indicate poor access of electricity and use of chemical substances in rural areas as most of children in this study were from the rural areas. The findings co relate with findings reported in other studies done elsewhere in East African areas [14].

Most of the patients in this study had 11%-15% BAS 109 (37.5%), followed by 5%-10% BSA 91(31.3%). The findings becomes similar with those reported 44% of BSA 11-15% in his study, but also the study correlate with what was reported in whose study reported that, majority of bunt children were <15% TBSA. However, the study differ from other studies which reported high prevalence to be BSA<10%[15].

Treatment outcome in this study was well as 286 (98.3%) were discharged alive while the mortality rate was 1.7%. The possible contributing factor for low mortality may be due to the fact that, most of the patients had BAS ≤ 20%, while literally, the high mortality the relation with high BSA due to the fact that higher mortality tends to increase with the TBSA. It is notified that, high mortality14.21% in his study was related by increasing BSA, older age and inhalation burn, but also, it is reported 12.4%. However, the mortality can be indicating an improvement of burn care at SRFH which prevent burn wound infection which normally increase mortality rate. Another good burn wound care indicator is significant Short Length of Hospitalization (LOH) on which in this study the maximum hospital stay 26 days while (258) 88.7% had less than twenty days, among these 28.8% (84) were discharged within seven days. The prolonged duration of hospitalization has been associated with pronged morbidity and mortality. Whenever done appropriately, first aid treatment for burns reduces severity of the injury, shortening the length of hospitalization and improving outcome of treatment. In the other hand, age was the predictor of outcome with p value of 0.028 in logistic regression analysis. It is not surprising that burn in extreme

age specifically pediatric is factor of unfavorable outcome due to thin skin and subcutaneous tissue hence likely to get dehydration due to loss extreme loss of body fluid quiescently to shock. The primary adequate rehydration is a Conner stone to prevent poor outcome.

### Study limitation

There were missing data from the Hospital medical records due to incomplete documentation of some patients. The study was unable to determine long term complications such as hypertrophic scar and keloids which might have developed in individual patients after discharge.

### Conclusion

Burn injury in children constitutes a significance morbidity and mortality at SFRH. Majority of childhood burn injuries at this hospital are scald and most affected children with two years of age with male predominance. There is a need for health and safety education to parents and caregivers aiming at to improve the children safety at home and other working areas. Inadequate or absence of public awareness may be the major contributing factor on addition to specialized health personnel.

### Conflict of Interest

Authors declare no conflict of interest.

### Data Availability

All relevant data are within the paper and its Supporting Information files.

### Author Contribution

All authors had equal participation and contribution during construction of this manuscript.

### Acknowledgement

We would like to thank to St Francis administrator Dr/Fr Gingo to allow the study to be conducted. Also we would like to give thanks to the Principal of St Francis university college of Health and Allied Sciences to allow this study to be conducted.

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**How to cite this article:** Karuhanga Theresia A, Macha Magreth E, Sakurani Baltazary Theobald, Them Lilian, Mgabo Mabusu, Rashidi Mayoka, Tekie Fassil, Mgonja Frida R. "Retrospective Study on Prevalence of Burn Injury among Children at St Francis Referral Hospital Morogoro Tanzania." *J Clin Res* 5 (2021) : 170.