

**PREVALANCE, CLINICAL PRESENTATION AND OUTCOME OF PAEDIATRIC
PATIENTS WITH BURNS MANAGED AND ADMITTED AT KIRYANDONGO
DISTRICT HOSPITAL UGANDA**

BY

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MAY 2018

DECLARATION

DECLARATION

I, ATYAM ARTHUR hereby declare that this research dissertation titled prevalence, clinical presentation and outcome of pediatric patients with burns managed and admitted at kiryandongo district hospital Uganda is my original work and idea, and has not been previously submitted by me or anyone, for any degree or diploma at this or any other institution


.....
Signature


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Date

APPROVAL

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This research dissertation titled prevalence, clinical presentation and outcome of pediatric patients with burns managed and admitted at kiryandongo district hospital Uganda has been prepared and submitted under my supervision:

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OPERATIONAL DEFINITIONS

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

Total body surface area (TBSA) is an estimate of the percentage of total body surface area involved in burn exposure and injury.

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. Third-degree burns 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.

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

Guardian is a person or care giver legally responsible for someone unable to manage their own affairs.

LIST OF ABBREVIATIONS AND ACRONYMS

WHO	WORLD HEALTH ORGANISATION
LOS	LENGTH OF STAY
TBSA	TOTAL BURN SURFACE AREA
CO	CARBONDIOXIDE
HIC	HIGH INCOME COUNTRY
LMIC	LOW AND MIDDLE INCOME COUNTRIES
ISBI	INTERNATIONAL SOCIETY FOR BURN INJURIES
A.A	AFRICAN AMERICAN
CDC	CENTERS FOR DISEASE CONTROL AND PREVENTION
KDH	KIRYANDONGO DISTRICT HOSPITAL
SES	SOCIAL ECONOMIC STATUS

ABSTRACT

Back ground: Burn injuries are a global public health problem, accounting for an estimated 195 000 deaths annually. The majority of these occur in low- and middle-income countries and the rate of child deaths from burns is currently over seven times higher in low- and middle-income countries than in high-income countries. Burn injuries are largely considered as being preventable. However, one needs to know the patterns, causes and outcomes of burn injuries if intervention measures are to be effective.

Objective: the aim of this study was to determine the prevalence, clinical presentation and outcome of pediatric patients with burns managed and admitted at kiryandongo district hospital Uganda from January 2018 – March 2018.

Methodology: This study was conducted at kiryandongo district hospital from January-March 2018 by implementing a retrospective cross sectional study design. A total of 199 burn patients were recruited by simple random sampling method. Data was collected from patients' medical record cards retrospectively. SPSS version 20 for windows was used for data entry and analysis. Descriptive statistics and logistic regression were used to analyze the data.

Result: Burn accounted for 13.07% of patients who had visited KDH during the study period. Children less than 3 years of age had the highest proportion of patients (53.3%) and the median total body surface area (TBSA) burned was 11% with a range of 1-95%. The most frequent burn injuries were scalds, followed by flame burns, contact burns with hot solid object and chemical burns with 59.8%, 33.17%, 3% and 1% respectively. Most of the burns (53.77%) healed with no or minor sequel and 3.52% of patients died in the study period. Cause of burn has statistically significant association with death ($P= 0.027$).

Conclusion and recommendation: The leading causes of burn are scalds which are preventable. Children should not be allowed in the kitchen and they should be kept in open safe paly areas or in their room with someone while their mothers are doing housework chores. The most effective way to prevent burns is public education.

Key words/phrases: pediatric burn injuries, scald, partial thickness burn, full thickness burn, TBS

CHAPTER ONE

1.0 INTRODUCTION

1.1 Historical Perspective

Burn injuries are a serious global health threat to young children. This threat is disproportionately concentrated in South-East Asia and Africa (World Health Organization, 2002). In sub-Saharan Africa alone it is estimated that between 18,000 and 30,000 children younger than age five die annually as a result of fire-related injuries (World Health Organisation, 2002). In addition, it is estimated that at least 300, 000 and possibly as many as 17 million cases of childhood burn injuries occur in Africa each year (Hyder, Kashyap, Fishman & Wali, 2004). Most burns are caused by thermal energy including scalding and fires, with the minority caused by exposure to chemicals, electricity, ultraviolet radiation, and ionizing radiation (Forjuoh, 2006).

Burns are tissue injuries resulting from direct contact with flames, hot liquids, gases, or surfaces; caustic chemicals; electricity; or radiation. Internal burn injuries can also result from smoke inhalation. Burn injuries are characterized by coagulative necrosis of the skin or other affected body tissues. The skin is the tissue most commonly injured with resultant compromise of its function as a barrier to injury and infection and as a regulator of body temperature, fluid loss, and sensation (Asuquo, Ekpo, & Ngim, 2009). In Uganda burn injuries account for 11% of all childhood injuries. (M Nakitto *et al* 2010)

Burns are caused by flames, contact with hot surfaces or ashes, hot fluids or steam, gas, electricity, radiation and extreme cold (frost bite). Flame burns occur when the body gets into contact with flames causing direct injury to tissues. The flames might ignite clothing and if synthetic, they melt adding a contact burn component to the injury. If the burn occurs in an enclosed area, the patient is at risk of carbon monoxide (CO) and cyanide poisoning.

Flash burns are a subset of flame burns and they are a result of rapid ignition of a flammable gas or liquid. The body parts involved are those exposed to the agent when it ignites and the areas covered by clothing are usually spared. A classic example of this type of injury occurs when a person pours gasoline on a trash or leaf fire to increase the flame and is burned by the subsequent fireball.

Contact burns result from direct contact with hot objects (e.g. soldering irons, cooking appliances, irons etc) or ashes and the injury is confined to the point of contact.

Scalds result from contact with all manners of hot fluids and in general, the more viscous the liquid and the longer the contact with the skin, the greater the damage. Steam burns often occur in industrial accidents or result from automobile radiator accidents. These burns produce extensive injury from the high heat-carrying capacity of steam and the dispersion of pressurized steam and liquid. Furthermore, steam inhalation can cause thermal injury to the distal airways of the lung. Inhalation of hot gas causes thermal injury to the upper airway and subsequent occlusion due to edema. The distal airways are usually not injured as the heat-exchange capacity of the upper airway is excellent. Injury to the distal airway is more likely to be due to the direct effects of the products of combustion on the mucosa and alveoli.

Electrical burns including lightning occur when heat is released following the passage of an electric current through tissue. Most problems from these burns present in patients exposed to high voltage (>1000 volts) current but children can have significant burns after exposure to 200 – 1000 volts. Concomitant ignition of clothing may produce flame burn and cardiac injury, long bone and spine fractures may occur.

Chemical burns are caused by alkaline or acidic substances coming into contact with the skin. If the agent is ingested, circum-oral, oro-pharyngeal and gastro-intestinal burns may occur (Herndon, 2007).

Burns are caused by extremes of temperature and are classified by cause as follows; Thermal (caused by hot fluids, objects/surfaces or flames), chemical, electrical, radiation and frost-bite (D'Souza et al, 2009). Thermal burns caused by fire (flame burns), hot liquids (scald) or contact with hot surfaces (contact burns) have been recognized as significant hazards for centuries and many fire disasters have resulted in catastrophes and loss of life (WHO, 2008b). Burn injuries to the skin can also be caused by ultraviolet radiation and radioactivity and to the respiratory tree by smoke inhalation (WHO, 2008b).

Thermal burns can be further classified according to percentage of total body area burned or by skin depth in the following manner; first-degree burns are limited to the epidermis, second-degree burns are limited to the dermal layers of the skin, third-degree burns are characterized by damage to all layers of the skin including some subcutaneous tissues and fourth-degree burns involve all layers of the skin as well as the underlying fascia, muscle, or bone.

Depending on the extent of Total Body Surface Area (TBSA) burnt and the depth, burns may further be categorized as minor, moderate or major and in the initial evaluation of burned patients in the emergency department this estimation determines whether or not to transfer to a specialized burn unit (Klingensmith, 2000).

Most burns are caused by wet (hot fluids and steam) or dry heat (e.g. hot surfaces/objects, ashes) and flames but may also occur following contact with chemicals or electricity. Burns caused by hot fluids (scalds) are most frequent in children whereas flame burns occur more frequently in adults;(Kalayi, 1994)

1.2 Theoretical Perspective

A significant body of literature has contributed to understanding the epidemiological characteristics, risk factors, treatment, and prevention of burns in LMIC settings (Forjuoh, 2006; Hyder et al., 2004). The accumulated research has been directed at the epidemiology of childhood burn injuries, the identification of the individual demographics and the circumstantial characteristics of burn injuries, some investigations into the mechanisms underlying these, and initial evaluations of prevention programmes (Forjuoh, 2006; Hyder *et al.*, 2004; Van Niekerk, 2006). The vast majority of these studies were descriptive using case reports, case series, or the cross-sectional design, compounding concerns about the knowledge of risk factors in these settings (Forjuoh, 2006).

1.3 Conceptual Perspective

Childhood burns are a major public health issue in Africa and many of the South Asian countries (Saidur R Mashreky, Rahman, Khan, Svanström, & Rahman, 2010)

Burn injuries and their predisposing factors have been well-studied in HICs, leading to a reduction in such injuries, largely through interventions and legislation to reduce risk exposure (Forjuoh, 2006). However, these injuries remain a significant public health concern in LMICs, where research and interventions to control exposure is lacking. The South African situation echoes that described for other LMICs (Albertyn, Bickler, & Rode, 2006). In recent years, there has been an increase in the attention directed at the epidemiology of childhood injuries in South Africa (and further afield across the LMICs contexts on the African continent (for example, in Ghana, Nigeria, Egypt, Morocco, Ethiopia), and elsewhere (Albertyn, Bickler & Rode, 2006). These studies all indicate that burn injuries are a leading cause of injury in young children, especially those aged between one and five years.

Incidence is increasing among pediatric patients. Highest in Africa (>96,000 children hospitalized / yr) Children <5 years old are at greatest risk In Ghana, 6.1% prevalence in children 0-5 yr In India, children 0-5 yr account for 50% of all children burns.(Atiyeh et al, 2009. Burd et al, 2005. Forjuo al, 2006)

1.4 Contextual Perspective

Incidence can vary greatly by race and ethnicity even with in a region: In South Africa, children of African descent have a burn rate of 4.5 per 100,000 compared to 0.3 for white children.(Duke *et al.*, 2011)

Disparities in the US: Burn admission rates are 7.7 x higher for African American (AA) than white children. AA and Native American children are 2 and 3 times as likely to die in fires as white children. (American Burn Association et al, 2009. Burrows *et al*, 2010. CDC et al, 2011)

A study done in Israel to assess childhood burns revealed that two thousand seven hundred and five children were hospitalized with burns (51% of all burn admissions). 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 burns. Surgical intervention increased from 6% in 1998 to 21% in 2002[15]

According to the results found in a study conducted to assess the epidemiology of childhood burn injuries in South Africa the incidence of burn injuries is higher in toddlers (15.8%) followed by infants (14.6%).The vast majority of burn injuries comprising infant scalding were incurred by infants and males and the scalding suffered on the upper body parts. Burns among old children with an over representation of flame related burns occurred in winter at night and early morning hours.

A study conducted in Dar es salaam, Somalia illustrated Scalding from hot water, hot food and hot cooking oil accounted for 75.8% of the burns while open flame burns accounted for 16.2% of the cases. Regarding the place of injury, 82.9% of patients came from the low-income settings, and 94.4% of the burns occurred in the home environment

Burn injuries are recognized by the World Health Organization (WHO) as a serious public health problem worldwide with more than 300,000 people dying from flame burns every year and many more dying as a result of scalds, electrical and chemical burns (WHO, 2011). Over 90% of burns are avoidable and 95% of burn deaths occur in low and middle income countries and are preventable. Many survivors of burns are permanently disabled or disfigured, have

adverse psychological effects and are often times stigmatized or discriminated upon (Asuquo et al, 2009; Lau, 2004; Liao *et al*, 2000; Mock, 2011; WHO, 2011a; WHO, 2011b).

In the developed world, the incidence of burn injuries has been reduced through prevention strategies including development of surveillance systems, legislation, social marketing and advocacy. Mortality of the burn injured victims has been lowered and disfigurement diminished by improved burn care, and burn survivor support groups have provided emotional support, assisting survivors to lead full and meaningful lives. These support groups have also been useful in advocacy for improvements in burn prevention and treatment (Mock, 2011; WHO, 2011b).

Sadly, these strategies are largely not being applied in the developing world and the WHO and the International Society for Burn Injuries (ISBI) have developed a partnership to increase international action with the first consultation on prevention and care of burns being held at the WHO headquarters in Geneva in April 2007 (Mock, 2011; WHO, 2011b).

Studies have shown that prevention programs such as public education and improved fire safety practices in homes, offices, institutions, industries etc, can result in prevention of many injuries including burns. Fewer burn cases translate into less morbidity and mortality as well as huge savings in health expenditure by government hospitals(Warda, Tenenbein, & Moffatt, 1999) (W

A comprehensive surveillance system for burns and other injuries is required for planning and evaluation of prevention programs and to raise awareness but few developing countries have such a system. The WHO in collaboration with Centers for Disease Control and Prevention (CDC) has published guidelines for injury surveillance. As a result of this, some countries such as China, Jamaica, Nicaragua, South Africa, Thailand and Uganda have started the development of injury-surveillance systems (Krug, 2004).

Delgado et al (2002) conducted a case control study to investigate burn injuries in a pediatric population in Lima, Peru in an effort to develop an effective preventive program and they concluded that prevention efforts are essential to reduce these injuries. They recommended the development of programs at a local level, tailored to the prevalent risk factors.

According to in their descriptive cross-sectional study, there is low public awareness on the risk and prevention of burn injuries. They identified alcohol intoxication and epilepsy as two

important risk factors and recommended public health campaign on the risk of burns and prevention tailored to different recipient communities.

1.5 Problem Statement

In Uganda the pediatric burns account for about 11% of all the burns in the country and (M Nakitto et al 2010) demand for the specialized burn services offered at KDH has gradually increased with majority of the cases being pediatric burn cases and hence creating a need for more patient beds and referrals to Mulago National Regional Referral Hospital burns unit has increased due to the lack of the proper management skills and equipment. Children constitute 75% of the burn victims seen in hospitals in and around Kampala. There are 5% of all surgical operations done in Mulago hospital (Mugisha, Okello Joseph et al 2013). The statistics show most admissions at the Burns Unit are children younger than 6 years old: More than 500 cases yearly! This means children with burns are disabled for the rest of their lives, and are kept away from public life. The causes of burns are the instable, unsafe cooking places, and fire in bedrooms because care takers don't blow out the candle before they leave the bedroom with the sleeping children. Most of the burns patients are very poor, and live below the poverty line in the slums and villages of Uganda. (UBPSI et al 2013-2014). Burn injury patients who survive are psychologically traumatized and many become permanently disfigured or maimed. Many burn injuries are preventable especially if the risk factors can be identified. The main objective of this study therefore was to identify the risk factors for the study population so that they may be targeted by prevention programs.

1.6 General Objective

To assess the prevalence, clinical presentation and outcome of pediatric burn patients at KDH.

1.7 Specific Objectives

The aim of this study was to determine the prevalence of pediatric burns in KDH and the outcome of these patients while on ward.

Specifically, the study sought to:

1. To determine the prevalence of burn injuries among pediatric patients
2. To assess the clinical conditions of pediatric burn patients at time of presentation
3. To assess the outcomes of pediatric burn injuries

1.8 Research Questions

- i. What are the socio-demographic characteristics of pediatric burns patients in KDH?
- ii. What are the types of burns among pediatric patients admitted at KDH?
- iii. What are the common risk factors for burn injuries treated at KDH?
- iv. What are the practices predisposing individuals to burns injuries?
- v. Are the burn injuries of patients hospitalized at the KDH preventable?
- vi. What is the total number of pediatric burns patients in KDH?

1.9 Research Hypothesis

1.9.1 Null Hypothesis (H₀)

There is no difference in the risk of sustaining a burn injury between burn injury patients and non-trauma patients hospitalized at KDH.

1.9.2 Alternative Hypothesis (H_a)

There is a difference in the risk of sustaining a burn injury between burn injury patients and non-trauma patients hospitalized at KDH.

1.10 Significance of the Study

Burn injury is one of the commonest injuries in children treated in hospitals in Uganda and worldwide. In the year 2012, 188,985 children under the age of 5 years were treated for injuries in out-patient departments of hospitals in Uganda. Burn injuries constituted 75,363 (39.9%) of these injuries whereas 113,622 (60.1%) children were treated for all other injuries combined. Burns therefore are a significant cause of injury in the under 5 age group compared to the other causes of injuries (Kenya National Bureau of Statistics, 2012). Some of the burns occur as a result of carelessness, ignorance or lack of preventive measures in homes. The relatively high cost, the attendant pain, misery and suffering of burn patients can be minimized or prevented all together if preventive measures are instituted. Very little interest has been put in the study of burns in pediatric cases in this country.

1.11 Conceptual Framework

Accidental injuries or deaths are attributed to bad luck or witchcraft by many people in the third world. For this reason the only prevention that some might consider would be prayers and/or a visit to the witchdoctor. Prevention has been proven in the developed world to reduce the morbidity and mortality resulting from injuries. Many burn injuries in Uganda can be

prevented after identification of the local risk factors and targeting them in national injury prevention programs.

The WHO has recorded success with a model for prevention of violence, road traffic accidents, child injuries and emergency and trauma care provision (WHO, 2008). This model is also the basis for WHO's 10 year strategy (2008 – 2017) for burn prevention and care in developing countries. This research will be a good local platform for this global strategy in Uganda using the conceptual framework adapted from the one of WHO

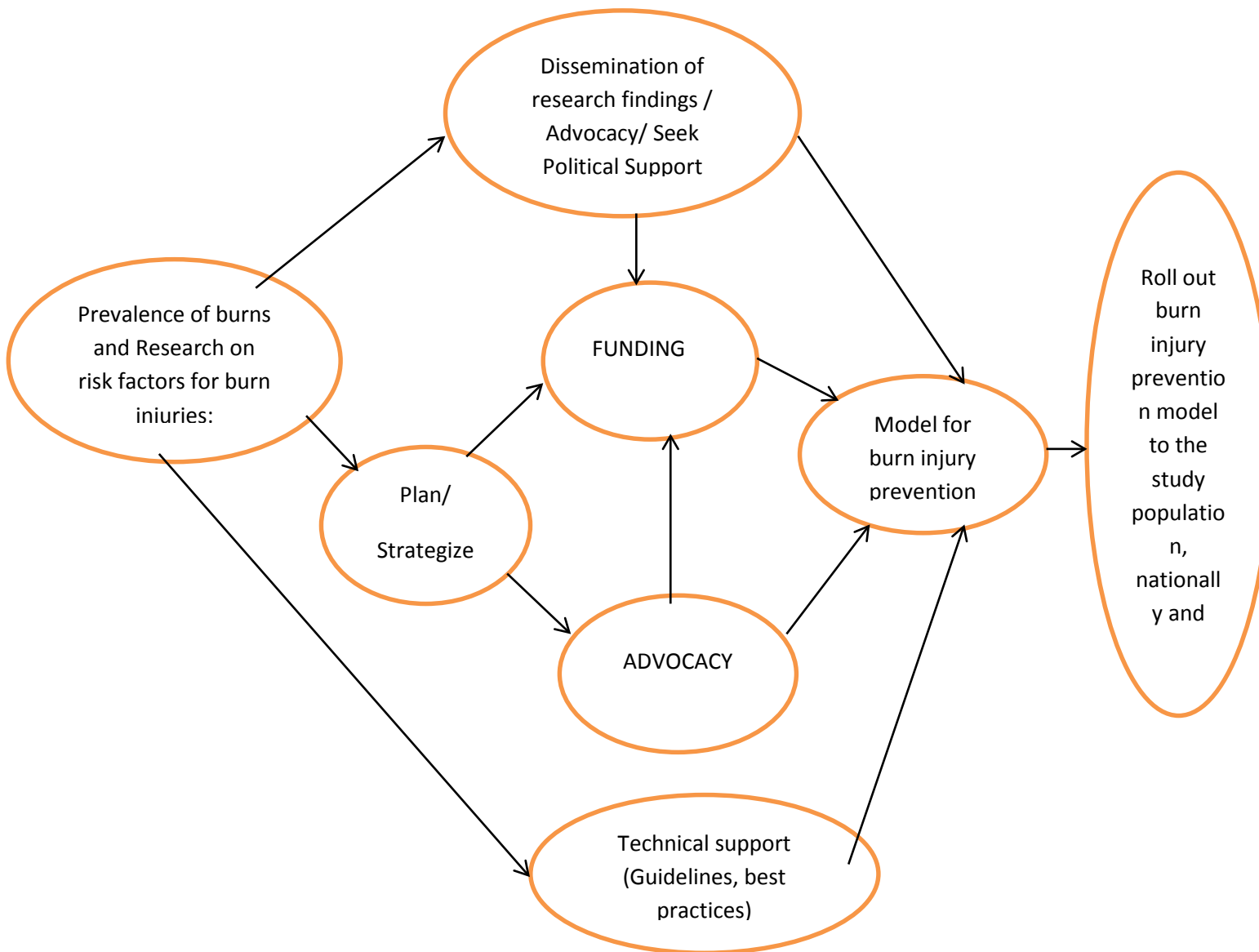


Figure 1: Conceptual Framework.

1.12 Scope

This study was conducted at the KDH in Kiryandongo, Uganda, in the surgical ward since its where all severe burn cases in the hospital are managed from and the outpatient clinic that manages the minor burns cases. This study will see cases from January 2018 to March 2018.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Risk Factors for Burn Injuries

People of all ages are susceptible to minor burn injury with the highest incidence occurring during the first few years of life and in those aged 20-29 years (Brusselaers, Monstrey, Vogelaers, Hoste, & Blot, 2010) (Delgado et al, 2001). The mechanism of minor burn injury is influenced by socio-economic factors and also varies considerably with the age of the victim. Minor burns in children younger than 4 years are caused primarily by contact with hot surfaces and liquids (scalds). After this age, a large number of heat sources (e.g., hot surface, liquid scald, grease scald, radiation, chemical) cause burn injury (Albertyn et al, 2006).

Many of the burns seen in Africa are as a result of poverty, illiteracy and migration to urban areas. Children are at greatest risk and sustain burns in preventable home accidents (Albertyn et al, 2006). Children are the most vulnerable and are at greatest risk because they have less perception about dangerous situations and limited ability to react appropriately (Saidur Rahman Mashreky *et al.*, 2008)

Risk factors for burn injuries vary from country to country but generally include alcohol and smoking, use of ground level stoves, long loose-fitting clothing, very hot bath water and faulty electrical wiring (WHO, 2008). In her review article of 34 studies, Edelman (2007) reported several Social Economic Status (SES) factors related to risk of burns and which may be considered when studying burn populations. These factors are; ethnicity (non-white), low income, large families, single parents, illiteracy, low maternal education, unemployment, job loss, substandard living conditions, not owning a home, not having a telephone and overcrowding.

Nderitu et al (2006) found the paraffin stove and epilepsy to be risk factors and 20% of the patients had relatives who had sustained burns previously. There was a positive correlation between level of education and risk awareness.

Delgado *et al* (2001) found that the factors associated with a high risk of sustaining burns were: lack of water supply, low income and crowding. Protective factors were: presence of a living room and better maternal education. They recommended that burn intervention measures should target low socioeconomic groups and designed according to local risk factors.

Mashreky et al (2010) in their case-control study conducted in Bangladesh found that family size, cooking area and use of the traditional kerosene lamp were determinants for childhood burns. They recommended isolation of the cooking area, replacement of the kupibati with hurricane lamps and introduction of parent's education programs as measures to curb burn injuries.

In their study of 284 burn admissions,(Tse et al., 2006) found no correlation between level of education of parents and burns incidence. They recommended use of printed material, internet, media and school curriculum to educate all about safety issues in the home.

In a Peruvian case control study Delgado et al (2010) found that poverty, crowding and lack of education were significant risk factors. Other studies done in Brazil, England and Greece had also determined a positive relationship of burn injuries with overcrowding, maternal socioeconomic status and ethnicity.

In their case-control study of 239 burn injury children at a children's hospital in Athens, Petridou et al (1998) found the kitchen to be a high risk area and there was a powerful inverse association of the burn avoidance index with burn injury risk. Supervision lapses and barefoot walking were also found to increase the risk of burn injuries

In a review of 117 studies aimed at assessing the status of burn preventive efforts Forjuoh (1996) found the same descriptive epidemiological characteristics but slightly different risk factors for burns in developing countries. These included pre-existing impairment in children, lapses in supervision, storage of flammable substances at home, low maternal education and overcrowding as well as several treatment modalities and preventive efforts including immediate application of cool water to a burned area.

2.2 Epidemiology's Of Burn Injuries

In the developed world, serious burn injuries occur most commonly in males (67%) with the highest incidence of serious burn injury occurring in young adults (20-29 yrs) followed by children younger than 9 years. Major causes of severe burn injury are flame burns (37%) and liquid scalds (24%). For children younger than 2 years, liquid scalds and hot surface burns account for nearly all serious burn injuries (Ytterstad and Sjøgaard, 1995). After age 2, flame burn is the most common cause of serious burn injuries, accounting for nearly one-third of all serious burns.

In structural fires, approximately one-half of all burn victims, many with only moderate burns of less than 40% body surface area, die of asphyxiation or carbon monoxide poisoning before reaching the hospital (WHO, 2008b).

Okonjo (1989), in his unpublished study on burns at the Kenyatta National Hospital (KNH), found that scalds and flame burns in children were 74.4% and 20.3% respectively. In adults, 63.8% of the burns were attributable to flame or dry heat and 8.5% to wet heat (scalds). In another local study, Nthumba (2002) reported 63.2% burns as caused by scalds and 36.7% by open flames. This latter pattern has been observed by many researchers all over the world with the majority of the children sustaining burns accidentally at home and the adults being injured at place of work or following assault (Asuquo et al, 2009; Boukind et al, 1995; Forjuoh et al, 1995; Muguti et al, 1994).

In their study of 109 consecutive burn patients admitted at KNH, Nderitu et al (2006) reported that 48.6% of them were children under 5 years of age, a majority of them with scald injuries. Most of the burns occurred at home (80.7%), with the rest occurring at work (11.0%) and elsewhere (8.3%). The causes of the burns were: scalds (51.3%), open flame (45.9%) and electricity (2.7%). The majority of the burns were accidental and involved children whereas adults mostly sustained flame burns.

In retrospective study of 4481 burns patients treated at a in South Korea burn centre between January 2003 and December 2012, Seo et al, 2015 found that the main causes of burns were; Fire (n=3017, 67.3%), Hot fluids, (n=986, 22.0%), Electricity (n=338, 7.5%) and Chemicals (n=72, 1.6%). Hot fluids (57.4%), fire (38.2%), Chemicals (2.6%) and Electricity (1.9%) were the commonest cause of burns in another retrospective epidemiological study from by Agbenorku et al of Ghana. The different aetiology of burns among countries is dictated by the different living standards and lifestyles (Agbenorku, 2011).

2.3 Impact of Burn Injuries

In the United States, the medical cost of primary care for one burns patient ranges from USD 3,000 – USD 5,000 per day (equivalent to Uganda shillings 10,500,000 – 18,000,000 per day). The economic impact of burns also includes loss of wages and the costs relating to post-burn deformities in terms of emotional trauma and loss of skills (WHO, 2011b). The medical cost of burns in developing countries is unknown. However, there is little doubt that the social and medical costs are enormous for families and societies.

Many burn victims require prolonged hospitalization for both the physical and the emotional trauma (Nderitu et al, 2006; Tse *et al*, 2006). The financial implications are enormous and most developing countries cannot afford the high cost of setting up modern burns care facilities (Asuquo et al, 2009).

In low-income countries, burn patients experience long hospital stays, post-burn complications such as wound infection, malnutrition and post-burn contractures. They have high mortality rates and are a major source of economic burden to families and society (Edwards et al, 2011).

2.4 Preventive Strategies for Burn Injuries

Researchers agree that the best treatment approach for burns is prevention and many communities around the world have introduced house fire prevention strategies that include education and training of children. Burd and Tse divided prevention of burn injuries into active and passive preventions: passive being modifications of equipment and materials, and active being education and provision of information for the target population (Burd, 2003; Tse et al, 2006). Active participation by children in learning fire responses was found to be more effective than the use of passive methods (Warda et al, 1999). In an Australian study, King et al (1999) demonstrated the value of community-based injury prevention campaign specifically targeting linguistically diverse communities.

The role of public health in burn injuries is to describe the magnitude of the problem by collecting data on mortality and morbidity from burn injuries and to study the risk and protective factors. Further, public health demonstrates the economic impact of burns on the community in order to provide a basis for cost-benefit analysis for burn injury preventive mechanisms (WHO, 2011).

Prevention of burn injuries requires knowledge of the epidemiological characteristics and associated risk factors for burns. This is acquired through sustained research on the descriptive epidemiology and risk factors for burn injuries. Great strides have been made in this regard in the developed world but the developing world still lags behind.

In a study of 421 New Zealand primary school children aged 7 – 13 years,(Harré, Field, & Polzer-Debruyne, 1998) concluded that investigation of children's involvement in household activities that carry an injury risk may help in the design of prevention strategies, including school-based education. Using four-way Analysis of Variance (ANOVA) they found significant main effect on burn risk for sex, age, ethnicity and sibling status. In New Zealand,

the fire service teaches fire safety and prevention strategies to school children. Knowledge of this was also studied and the level found to be high.

Delgado et al (2010), in their study on risk factors for burn injuries in children, concluded that the implementation of intervention programmes should not wait for the socio-economic status of communities to improve. To reduce this common cause of injury, especially in children, they proposed that prevention efforts be urgently developed on a local level in response to risk factors identified in individual areas.

The WHO Plan for Burn Prevention and Care will address the spectrum of injury control as applied to burns including improving data services, surveillance, promotion of burn prevention strategies and encouraging innovative pilot programs to address burn-prevention priorities in areas where the risk factors have not been well addressed, such as in rural areas (WHO, 2011b). The WHO approach for addressing the world burden of burn injuries is illustrated in the theoretical framework shown in Figure 1 and which appears in the WHO Plan for Burn Prevention and Care. This model has generally been used to good effect by the WHO Department of Violence and Injury Prevention and Disability and is the basis of the WHO Burn Prevention Programme (WHO, 2011b). The principles of this model will be applied in planning and implementing burn injury prevention strategies for KDH after this study is concluded.

The co-operation between WHO and ISBI is anticipated to result in diminished frequency of burn injuries and fire disasters around the world. The results of this research will hopefully aid the achievement of these goals locally. Similar WHO activities aimed at violence prevention and traffic safety have significantly drawn attention to these problems globally (WHO, 2011b).

In conclusion, suffice it to say that burn injury prevention programs save costs of burn care and more importantly result in improved health for the community. Such programs are based on the evidence provided by research on risk factors, some of which may be specific to a particular community due to socio-economic and other circumstances. Several descriptive studies on burns have been done in sub-Saharan Africa but literature review did not reveal any case control study on burn injuries (Albertyn et al, 2006; Kalayi, 1994; Nderitu et al, 2006).

CHAPTER THREE

3.0 STUDY DESIGN AND METHODOLOGY

3.1 Study Design

A retrospective descriptive cross sectional study was employed to assess the magnitude, clinical presentation and outcome of pediatric burn injuries for months of January 2018 up to March 2018.

3.2 Study Site

This study was conducted at the KDH in Kiryandongo, Uganda, which is a 106-bed government hospital with a staff establishment of 4,700 which includes 260 doctors and 2000 nurses

3.3 Source Population

Kiryandongo General Hospital in, Kiryandongo district in north western Uganda, covering 3949 square kilometers with a population of 266,197 with male being 133,701 and female 132,496 according to the national population and housing census 2014. The district is bordered by districts; Apac on its East, Masindi on its South, Buliisa on its West and Nwoya on its North, Oyam in North east. The major economic activities of Kiryandongo include but not limited to crop and animal farming, fishing, trade in retail and wholesale, carpentry and workshops for furniture, Hotels, food kiosks, boda-boda, taxi services, industry of advocates, clinics, educational institutions and churches. It's made up of different tribes the predominant tribe is Alur and other tribes include: Chope, Langi, Lugubala, Kakwa, Bagishu Banyoro and Bahima, however, there are refugees in Kiryandongo who belong to diverse ethnic backgrounds basically because of their origin; the Acholi, the Masaaba, Kenyan Luos, the Congolese and the South Sudanese Dinkas, Kuku, Nuer, Kakwa, Madi, and Siluk. . Major crops grown include Cassava, Sweet Potatoes, Maize, Beans and Groundnuts. Others are Simsim, Rice and vegetables. Cash crops including Cotton, Sunflower and Tobacco are widely grown for income generation. Other major activities carried out include livestock rearing, fishing, Cassava, coffee and tea. The area has both permanent and semi-permanent houses. Many permanent houses are found in the heart of the town while most of the semi-permanent is within the suburbs of the town. Kiryandongo General Hospital has a projected population of 400,000 with a service area covering the area of Kiryandongo, Masindi, Nakasongola, Oyam, Apac, Nwoya, and Amuru.

3.4 Eligibility Criteria

3.4.1 Inclusion Criteria

- Burn patients less than 18 years of age admitted and outpatient children with burn injuries

3.4.2 Exclusion Criteria

- Incomplete questionnaires will be excluded from the study
- Burn patients more than 18years

3.5 Measurement Variables

3.5.1 Dependent Variables

Outcomes of burn injuries

3.5.2 Independent Variables

Age and sex of the child

Concomitant medical conditions

Presence of disability Provision of pre hospital care or first aid

Length of hospital stay

Clinical presentation (shock, airway compromise, loss of consciousness etc...)

Severity (degree) of burn

Cause and setting of burn injury

Presence of Hospital acquired infections

Child abuse versus accidental injuries

3.6 Sample Size and Sampling Procedure

3.6.1 Sample Size Determination

The sample size for this study was determined by using single population proportion formula by considering 50% prevalence of burn injury and 95% confidence interval and 5% margin of error.

$$n = (Z_{\alpha/2})^2 p(1-p) / w^2$$

Where n is sample size

$Z_{\alpha/2}$ - with 95 % confidence interval equal to 1.96

P- Estimation of population proportion which is 50%

W –margin of error which is 1-confidence level=1-0.95=0.05

Then, $n = (1.96)^2(0.5)(0.5) / 0.05^2 = 384$

I have added 10% contingency for illegible hand writing and incomplete cards, So 199 patients' medical record cards were included for final analysis.

3.6.2 Sampling Procedure

We will get the records in the records room and sample them.

3.7 Data Collection

Data was collected from patients' medical record cards by using pre tested data collection sheet and 10% of the records were cross checked against hospital medical records. The contents of the data collection sheet are included in this proposal

3.9 Data Entry and Analysis

Data entry and analysis was done by using Epi info version 6 and SPSS version 20.0 for windows. The data was double entered and cleaning was done. The generated data was compiled by frequency tables, charts, and graphs. Descriptive statistics and multiple logistic regressions were used to analyze categorical variables and significance was set at P value of < 0.05

3.10 Quality Control

The data collecting sheet was standardized by testing it in 5% of the sample size before the study to make sure that the data collecting sheet was capable of yielding the required data for the study and some modifications was done according to the results found. The collected data was checked for completeness consistency and clarity.

3.11 Ethical Consideration

A copy was sent to Research Ethics Committee KIUTH for ethical approval, an introductory letter was requested from the School of clinical medicine and dentistry KIUTH. Permission

was requested from the administrator Kiryandongo Genera Hospital to conduct the study in the hospital, while in the surgical ward it was got from the In-Charge, and an informed consent was obtained from respondents before issuing out questionnaires and serial numbers were used instead of names for equal and utmost confidentiality of the information that was to be given.

CHAPTER FOUR

4.0 RESULT

In the study period 2,731 patients aged less than 18 years of age had visited KDH both in the surgical inpatient and outpatient departments of which 357 (13.07%) patients had sustained a burn injury. Among patients who sustained a burn injury 246 (9.00%) patients were admitted to the burn unit and the rest were managed on the outpatient basis.

4.1 Age and Sex

A total of 199 patients were studied of which 104 (52.26%) patients were males and 95 (47.74%) were females. The mean age of the children was 4.77 years (range 2 months to 17 years). Children less than 3 years of age had the highest proportion of patients (53.3%) and the number of children who sustained a burn injury decreases as their age increases. Sixty-six percent of children aged 4-6 were females, but the number of boys was higher in the less than 3 and 16-17 age groups.

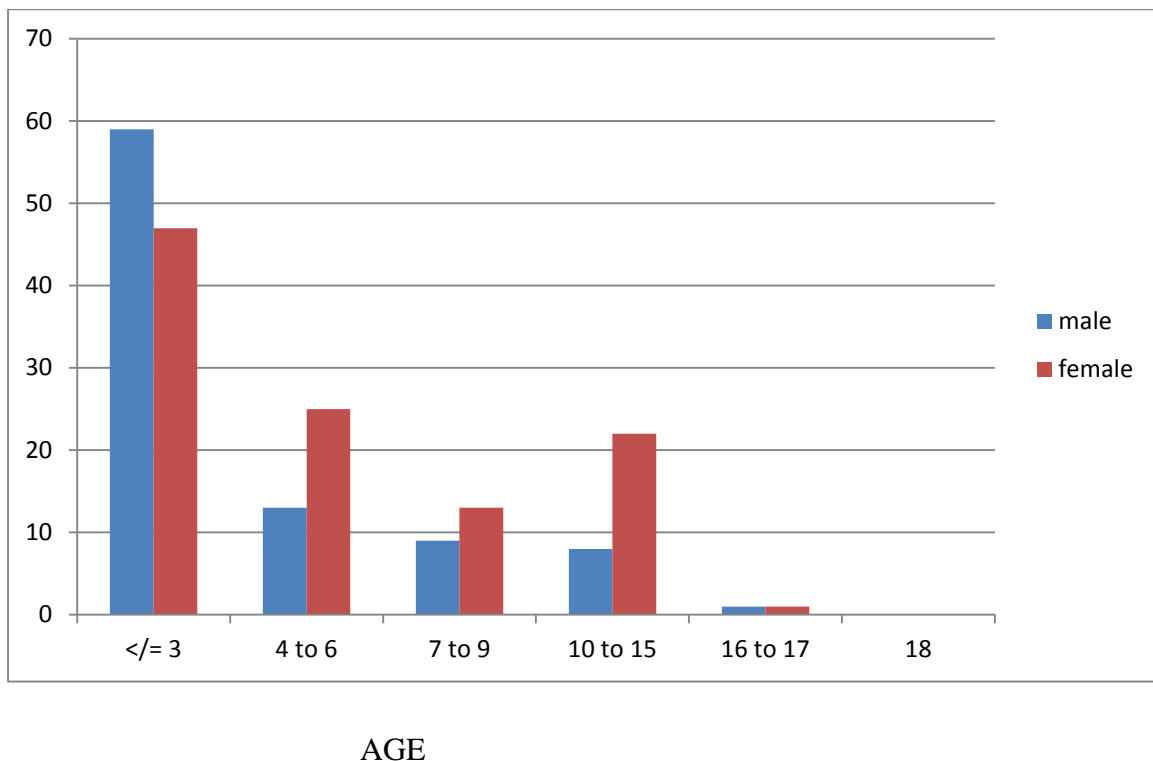


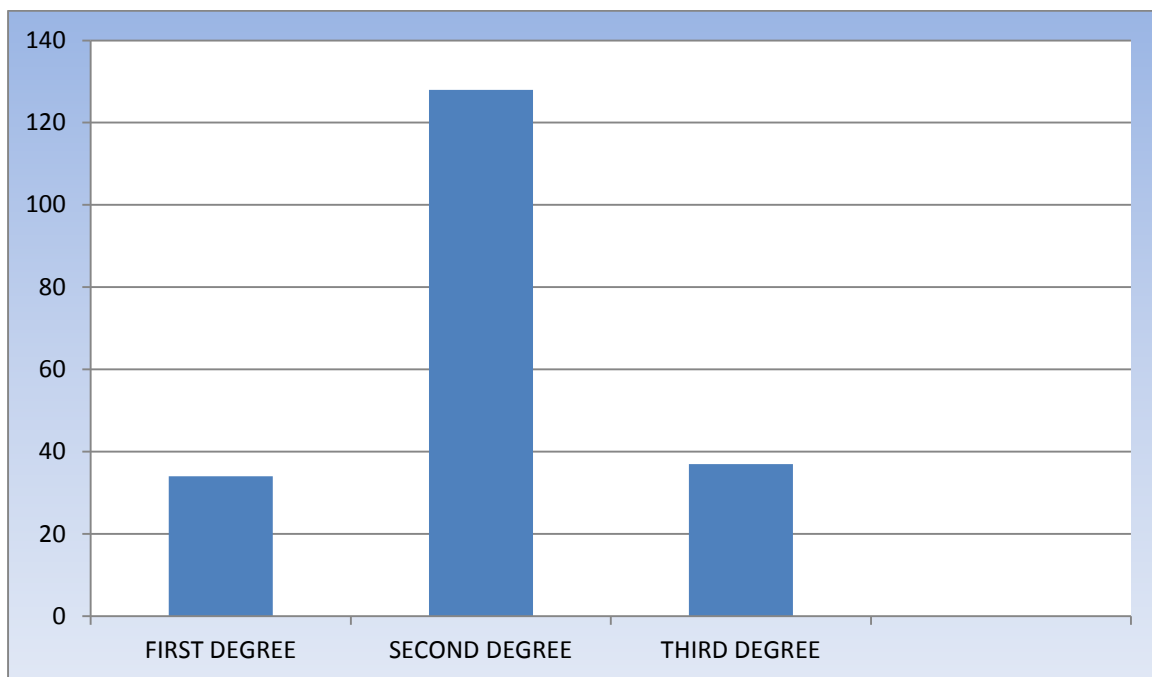
Figure 2: Distribution of Burns by Age and Sex

4.2 Geographical Distribution and Residence

Of the 199 patients studied 53% came from panyadole health center III as referrals, 26% of the patients were from kigumba health Centre II, 15% came from bweyale, 6% came from bunyama village, 3% came from kisorosoro.

4.3 Extent and Severity of Burn Injuries

The median total body surface area (TBSA) burned at the time of presentation, determined based on the medical records was 11% with a range of 1-95% (mean: 14.7; SD: 12.3). Burn extent in 80.1% of patients was less than 20% of TBSA, 16.4% of victims had sustained burn injury that had covered 20-40% of TBSA and two patient had suffered 95% TBSA burn. Among 199 subjects 64.5% of burn victims had second degree burns, 18.5% had sustained third degree burns and 17% had experienced first degree burns.



SEVERITY OF BURNS

Figure 3: Severity (Degree) Of Pediatric Burn Injuries at KDH, during the period of JANUARY 2018 TO MARCH 2018.

4.4 Causes of Burn Injuries

The most frequent burn injuries were scalds, accounting for 59.80% (119) of all injuries and followed by flame burns at 36.18% (72), contact burns at 3.01% (6) and chemical burns at

1.00% (2). Of all scald injuries, 49.75% (59), 25.13% (30), 17.59% (21), 5.03% (6), and 2.51% (3) were due to hot water, hot milk, hot tea, hot sauce, and hot oil respectively.

The most frequent cause of burn in children less than 6 years of age was scald. Children aged 16-17 years neither had contact burns nor chemical burns, but contact burns were seen in the remaining age groups though rarely. Flame burn injuries were more prevalent in children less than 3 years of age and in the 10-15 years age group and among those patients who sustained flame burn injuries females contributed for 60.5%. I had no patients at the age of 18 years.

Table 1: Cause of Burn Trauma in Different Age Groups

AGE GROUP	CAUSE OF BURNS					TOTAL
	SCALD	FLAME	ELECTRICITY	CHEMICALS	CONTACT	
<=3	80	27	0	0	2	109
4-6	25	14	0	0	1	40
7-9	6	13	0	2	1	22
10-15	7	16	0	0	2	25
16-17	1	2		0	0	3
18	0	0	0	0	0	0
TOTAL	119	72	0	2	6	199

4.5 Anatomic Locations and Setting of Burn Injuries

Anatomically the majority of the burns are confined to the lower extremities (18.5%) followed by burns on the upper extremities (15.9%). Upper extremities and trunk were affected in 8.3% of the victims and anterior trunk was burnt in 4.3% of the study subjects. The vast majority of injuries happened in domestic environment (86.3%), followed by outdoor settings in 11.1%, 2.6% in schools.

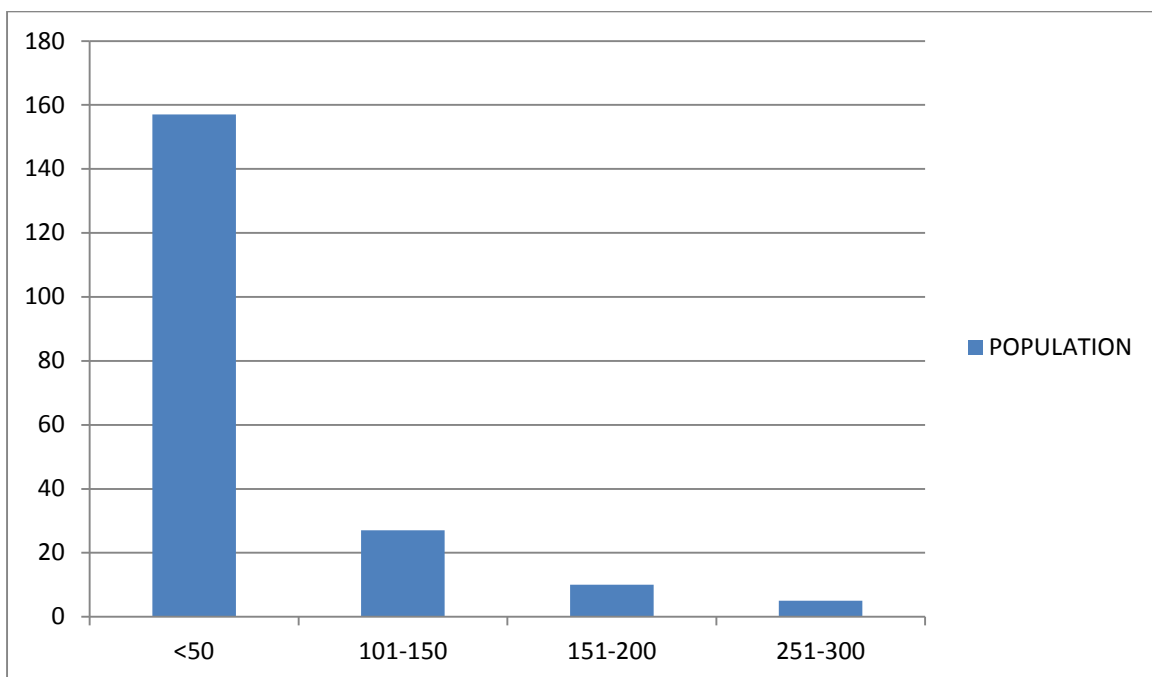
4.6 Provision of Pre Hospital Care

Among 199 study participants, pre hospital intervention was provided in 157 (79%) of patients. Of those patients who had received pre hospital interventions only 56 (28.14%) of them

received interventions which are considered to be appropriate. These included cold water, irrigation, analgesics, TTC eye ointment and respectively). 101(64.33%) patients had pre hospital interventions which are considered either of unclear benefit or out rightly harmful. These included dough, cooking oil, honey, herbs, tooth paste, salt, Vaseline, in descending order.

4.7 Length of Hospital Stay and Duration of Injuries before Presentation

The mean length of hospital stay was 21.25 days (median: 4.5; range: 1-257 days). Most of the patients (58.8%) came to the emergency department within 6 hours, 21.6% of the subjects seek health care within 7hours-24 hours.



Duration of hospital stay in days.

Figure 4: Lengths of hospital stay of pediatric burn patients at KDH from January 2018 to March 2018

Table 2: Duration of time before seeking medical care after injury

Number of hours and days before seeking medical help	Frequency	Percent
<= 6hours	117	58.81
7hours – 1day	43	21.12
2days – 5days	24	12.43
6days-10days	12	6.03
11 – 15 days	2	1.54
Total	199	100

4.8 Clinical Condition at Time of Presentation

Seventy percent of patients (139) were healthy before the burn incident and the rest had concomitant medical conditions like malnutrition (11.3%), epilepsy (5.92%), and anemia (5.45%), (11%) of the burn cases were due to child maltreatment, with parents, care givers or relatives dipping the victims in hot water, pouring hot fluids on them, contact with hot metal (knife, fork and hot iron) or burning the child with candle flame. Majority of victims of these intentional injuries are children aged between 4-6 years of age (47%). The reason for child maltreatment was to punish misbehaving children, to punish those children who did not obey orders or as revenge to parents when care takers argue with the parents and alcoholic parents taking out frustration on their children.

Regarding clinical presentation at time of evaluation, 66 patients presented with sign of wound infection. Nineteen patients presented with post burn contracture (PBC), while 5 patients presented with skin discoloration and decreased sensation and 15 patients were unconscious at time of presentation. Flame burns were associated with facial and peri orbital edema (11 patients)

4.9 Outcome of Pediatric Burn Patients

Most of the burns (107) healed with no complication or with minor scar and 7 (3.52%) of patients died in the study period. Among those who died, most of them had flame burn injuries (84.8%).

A multiple logistic regression was performed to ascertain the effect of age, sex, cause of burn, severity of burn, presence of shock and child maltreatment on the outcome of burn i.e. death.

From the results of multiple logistic regression only cause of burn has statistically Children less than 3 years of age constituted 36% of deaths and children aged between 4-6, 7-9 and 10-15 years of age accounted for 21.21% of the overall deaths each. Twenty three (5.4%) of patients had significant morbidity in the form of contractures, unsightly scars. Seventeen (8.54%) of patients required surgical interventions in the form of escharotomy, contracture release and /or skin graft. significant association with death. (P= 0.027)

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

Burn injuries remain a leading cause of injuries in children. This form of trauma is one of the commonest causes of hospitalization due to accidents among pediatric patients. Care for the burned child continues to demand close attention of a multi-disciplinary team. In this study the incidence of pediatric burn injuries found to be 13.07% which is lower than the findings of the study which was conducted to analyze the epidemiology of burns in surgical ward of Gulu hospital which was 64.30%. This significant difference could be explained by the fact that our study was conducted in the hospital that serves as district hospital in the country where minority of burn cases are treated and while their study was done at a regional referral hospital having a bigger number of cases at a time. (David lagoro kitara et al 2010)

5.2 Socio-Demographic Characteristics

Age And Gender Distribution: This study showed a slight overall predominance of male patients (52.26%) in comparison to female patients (47.74) as well as other studies done show a predominance of male as compared to females (Peck MD, 2011). However, Shresta SR and Kidanu EN. et al found a predominance of females in their study (Shresta SR et al 2006) The main cause of predominance of male child may be possibly due to increased exposure to activities that produce injuries and a pattern of more risk taking and rougher play than females.

My study showed that most of pediatric burn injuries occurred at home (86.3%) and is comparable with other studies which revealed 94.4% [8], 86.36% (6) and 80-90% (12) of burns occurred in domestic settings. I found that 53.3% (n=106) of the burn-injured children were under three years old. This age Group has also been reported in other studies to be the most vulnerable to burn injuries (Shresta SR et al 2006, Balseven A, Ali R, Alper K, Kaya K. et al 2009). This finding is consistent with the results found in a study conducted to assess the epidemiology of childhood burn injuries in South Africa that the incidence of burn injuries is higher in toddlers (15.8%) followed by infants (14.6%) (Simmons MA, Kimble RM et al 2010). The other age groups according to our study, more vulnerable for this injury after this age group were 4-6 years of age group (19.43%). Significant numbers of patients were referred from health center III since KDH is the nearest district hospital in the vicinity.

5.3 Type of Burn

Various observations had reported that scald was the most common cause of burn injuries (Delgado J et al 2002, Okoro PE et al 2009). Similarly in the present study the most frequent cause of burn injuries was scald (59.80%). This can be explained by the fact that children especially toddlers and preschool children stay with their mothers or care takers at home, and would probably be left playing in the kitchen environment. With the explorative and inquisitive nature of children, it is not surprising that they get scalded by liquid foods being cooked by their parents or care takers. In my study scalds were commonly caused by hot or boiling water which is consistent with the findings of the study done in Turkey which was conducted to assess burn injuries among children aged up to seven years (Balseven A et al 2009). In my study flame burn injuries were the second most common frequent cause of burn trauma and is often caused by open flames when bush burning in the dry seasons and cooking food outdoors with no safety precautions, house burn accidents and careless use of different flammable substances that serve as a light source in rural areas like candles and traditional kerosene light equipments (“tadoba”). Flame burn injuries were more prevalent in children aged 10-15 years which is in agreement with the finding of the study conducted in South Africa to assess the epidemiology of childhood burn injuries (van Niekerk A et al). This may be related to increased physical mobility and social independence of older children and children in this age group may be exposed to high risk activities such as cooking and lighting fires to burn rubbish

In the present study, only 6(3.00%) children had burns caused by contact with hot solid objects. These hot solid objects were usually those placed on the fire wood stoves which are used for cooking in many households of Kiryandongo district. Likewise, a Turkish study done to assess burn injuries among children aged up to seven years , reported that only 4.5% of children had encountered burns caused by contact with hot solid objects (Balseven A, et al 2009) . Burns due to hot solid objects might affect large body surface areas but that they usually caused burns over small areas so the victim may not present to health institutions. This may explain why few cases of burns due to hot solid objects presented to KDH.

5.4 Clinical Condition at Time of Presentation

This study revealed that (11.30%) of the burn cases were due to child maltreatment. The incidence of suspected abuse was lower in the Nigerian study that it accounted for 7.5% of the cases of hot water (Okoro PE, et al 2009). This incidence of abuse in the above study could be attributed to the traditional practice of Nigerian people to dip or pour hot water on a child who is convulsing for the purpose of treating the convulsion. In Kiryadondongo context, parents,

relatives or guardians of children abuse them just as a form of punishment and there is no such a practice of pouring hot water as a treatment of convulsion in their set up. Since children included in this study were younger than eighteen years and they were supposed to be under the care of their parents or guardians, it should be remembered that parental abuse and neglect may play a role in burn injuries in these children. It is known that some childhood burns result from neglect. However, it is not easy to distinguish deliberate actions from neglect and accidents. Therefore, pediatric forensic examination should be performed if a child is likely to suffer from abuse, neglect or intentional injury. The healthy cases prior to the burns were (70%), epilepsy was (5.92%) and these occurred when the children convulsed near a fire source and would end up falling in the fire or hot contact. Anemia had (5.45%), malnutrition (11.3%) probably as the child is looking for something to eat they end up getting burnt.

5.5 Seeking Medical Help

Regarding duration of injury before seeking medical care, most of my study participants (85.8) presented to the emergency department within 24 hours of injury. When compared with the above Nigerian study, only 56.7% of children presented to the hospital within 24 hours. This could be explained by the fact that majority of the injuries in the above mentioned study were minor so that the victims did not seek medical attention early (Okoro, Igwe, & Ukachukwu, 2009),

5.6 Duration of Hospital Stay

I found that the median length of hospital stay was 4.5 days (mean: 21.25 days; range: 1-257 days). A study done by Mulat T et al to assess the description of patients admitted to a burn unit of Yekatit hospital reported that the overall median hospital stay was 44 days (Mulat T et al 2006). The difference in LOS between the two studies could be attributed to the difference of age in the study subjects, i.e. unlike our study participants, the above study includes adult burn victims in whom the commonest cause of burn injury was flame, which in turn is associated with increased involvement of body surface area due to clothing ignition accidents and is also associated inhalational injuries, which could have forced them to have prolonged stays in hospital. The other factor for this significant variability in the duration of hospital stay could be justified by the fact that wounds in children typically exhibit faster rates of healing compared to adults.

5.7 Total Body Surface Area of Burns

In this study Burn extent in 80.1% of patients was less than 20% of TBSA, 16.4% of victims had sustained burn in jury that had covered 20-40% of TBSA and (1%) suffered 95% TBSA burn and this finding is comparable with a study conducted in Israel in which Burn extent in 83% of the patients was less than 20% TBSA (Goldsman S et al 2007). Previous study showed that the average mean total body surface area (TBSA) burnt was 17.1 % (Mulat T. Et al 2007). However, the median TBSA burnt in my study at the time of presentation, determined based on the medical records was 11% which is lesser. This might be attributable to the variability of the causative agents of burns between the two studies i.e. unlike mine; flame was the commonest cause of burn in their study, which is most probably associated with large body surface area burned

As per the results of a study done in South Eastern Nigeria, Partial-thickness burn occurred in 84.9% patients and full-thickness burn 15.1% of patients (Okoro PE, et al 2009) which is consistent with my finding that 81.5% of patients had sustained partial thickness burn and 18.5% had experienced full thickness burn. In the current study, one hundred ninety nine children with burns had too many distinct anatomical sites of injury with 34.4% of the burn injuries being confined to the extremities which is in agreement with what Daniel E et al found in a survey of burn admissions to Tikur Anbessa specialized hospital that burns involving the extremities were most frequent (Daniel E, Yoo Mc et al 1990). The similarity of locations of burns on the body in the two studies may be attributable to the similarity of the causative factors. Scalding most frequently occurred when children reached for a container of hot liquid while playing, either by pulling a hot substance from a cooking stove or a countertop. This could result in immersion or spilling of the hot substance on the children's extremities. In addition children might step on fire or hot solids while playing.

5.8 Care Of Burns

Concerning provision of pre hospital interventions, 79% of our study subjects received Pre hospital interventions. Almost the same findings were reported from a study conducted in Australia in terms of the provision of first aid measures that most (86.1%) of pediatric burn victims got pre hospital interventions (Cuttle L. et al 2009). However, when we compare the measures that were used as first aid to burn victims in the two studies we noticed that they vary greatly. In my study though the majority of burn victims had received first aid measures, only 28.14% had received first aid measures which we considered appropriate. These included cold water irrigation, analgesics and TTC eye ointment. However, in the above study, the majority

of patients (80.2%) had the recommended first aid measure i.e. cold water irrigation. In this study among those who had received first aid 64.33 % patients had interventions which are considered either of unclear benefit or out rightly harmful. These included dough, cooking oil, coffee powder, honey, herbs, tooth paste, salt, Vaseline, and ice in descending order. Deleterious interventions in children are still very common in our environment. Application of raw eggs may enhance wound infection as it creates a favorable media for bacterial growth. Additionally, the application of dry salt may worsen inflammation and ice application could lead to deepening of burn depth. Appropriate health education should be given to abolish these harmful practices. The mortality rate was only 3.8% in a study done in Nigeria to assess childhood burns (Okoro PE et al 2009). On the other hand the mortality in my study was about the same which was 3.52% (n= 7). In Iranian study the mortality of pediatric burn patient was 5.6% (Rafii MH et al 2012). Among those patients who died 67.8% of them died because of fire and flame injuries which is comparable with our finding that that most of the patients died had sustained flame burn injuries (84.8%). Complications resulting in morbidity and mortality include, wound infection leading to septicemia and septic shock, hypovolemia with hypovolemic shock, which gave a mortality of 100% of those who developed shock state.

5.9 Limitation

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. So, it is impossible to get clear and consistent clinical features of patients as all of the information might not be recorded on the cards. There are some features that could only be assessed by observation or by taking history. It might be good to use a prospective study design which may help to overcome the above mentioned problem

5. 10 Conclusion

The incidence of burn among pediatric patients was 13.07% and children less than 3 years of age had the highest proportion of patients and the number of children who sustained a burn injury decreases as their age increases. Most of the injuries were anatomically confined to the extremities. The most common cause of burn was exposure to scald followed by flame. The mean TBSA was 11% and the majority of the burns were second degree. Majority of patients had received pre hospital interventions which are considered to be either of unclear benefit or out rightly harmful. The mortality was 3.52% and complications resulting in morbidity and mortality include wound infection, leading to septicemia and septic shock, hypovolemia and hypovolemic shock, which gave mortality of 100% in those who developed shock state.

Finally, burn injuries are very common throughout the world and especially in the Underdeveloped countries like ours where people frequently use traditional open fire cooking and in our setting availability and access to burn care facilities and proper treatment are compromised. Burns in childhood cause huge financial and social burdens on individuals, families, society and the nation.

5.11 Recommendation

The leading causes of burn are hot water, milk, oil, and soup which are preventable. Children should not be allowed in the kitchen and they should be kept in open safe play areas or in their room with someone while their mothers are doing housework chores. Crawling children are especially at risk of burns since they move around the house. They should not be left unattended

A high rate of childhood burns requires hospital admissions and prolonged hospital stays. To reduce this burden, a burn prevention strategy and prevention program for the country should be developed. Simple preventive measures can help to eliminate burn injuries. Playing and lack of parental care were leading predisposing factors for burns in children. Keeping children out of kitchen is a simple measure that could avert injuries. However this is not possible in one room household. The most effective way is public education. Especially parents with preschool children should be offered education about preventive measures against burns and the initial intervention of burn injuries. Certain harmful practices like applying raw egg and ice as a means of treating burns is based on ignorance and must be discouraged

Since childhood burn injuries are a prevalent public health problem, it is strongly suggested to set up a well-equipped burn units in district hospitals in addition to KDH.(Keneally, Shields, Hsu, Prior, & Creamer, 2018) Availability and accessibility of burn units in all parts of the country will hopefully improve the outcome and quality of care and reduce unnecessary transport and service costs to the victims. It will be valuable if further studies are conducted to assess the standard management trends of pediatric burns since almost all patients who had developed shock had died which could possibly due to inadequate resuscitation.

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APPENDICES

Appendix 1: Information Sheet

Name of the investigator: Atyam Arthur. A student at Kampala International University pursuing a course in bachelors of medicine and surgery.

Research title: Prevalence, clinical presentation and outcome of pediatric patients with burns managed and admitted at kiryandongo district hospital Uganda

Research objective the aim of this study is to assess Prevalence, clinical presentation and outcome of pediatric patients with burns managed and admitted at kiryandongo district hospital Uganda from January 2018 to March 2018.

Study procedure to achieve the planned objective of this study, socio demographic data, clinical history and course of management of patients will be taken from patients' medical records. Confidentiality the collected information will be kept confidential and used only for research purpose. No one except the members of the research team will have access to the information collected. The name and/or other personal information of patients will not be notified in any report. All paper and computer records of the study will be kept in a secured place under lock when not in use. Person to contact if the data collectors or other hospital administrative staffs have any question regarding the study they are free to contact me in person or by the following;

Phone number 0778530309

E-mail. maytaarthur@gmail.com

Appendix 2: Hospital Consent Form

This is a study that will be conducted in KDH in kiryandongo district. The main objective of this study is to characterize the prevalence, clinical presentation and outcome of pediatric patients with burns managed and admitted at kiryandongo district hospital Uganda. Such assessment is needed for preventive and therapeutic approaches in the area of childhood burn injuries that should be based on appropriate knowledge of general epidemiologic data of burn injuries in our region and on a national scale and also for the availability of information to help emergency department personnel on the proper management of burn cases. Pediatric burn injuries are least explored areas among other injuries and very little is known about the patterns and clinical presentation of burn injuries in Uganda. Therefore the hospital's participation and collaboration is very much helpful in generating the required information and will be very much appreciated.

In this study data will be collected from the patients' medical record cards retrospectively. Information regarding any specific personal identifiers like the name of the clients will not be collected and information generated will be disclosed in totality. In addition confidentiality of any personal information will be maintained throughout the study process and no unauthorized access to the information is allowed.

Finally, the hospital has all the right to refuse to participate in this study at any time. If you have any questions or need further information regarding the planned study you are free to get clarification from the principal investigator or from the institution or through the following address. Atyam Arthur, phone number 077853039. Therefore, if you would like to participate in this study, would you please confirm it by signing here. Thank you very much.

Signed..... (Participant) serial number.....

Signed..... (Research assistant/Investigator)

Date.....

Appendix 3: Data Collection Sheet For Pediatric Patients In KGH

I. Socio-demographic data of the child

1. Outpatient number_____ 2. In patient number_____
3. Age_____ 4. Sex_____ 5. Address_____ 6. Family size_____ 7. Birth order__

II .socio demographic data of the parent or guardian

1. Age_____ 2.sex_____
3. Marital status of parents or guardians
- a. Married b. single c. widowed d. divorced e. separated
4. Educational status of the parent or the guardian
- a. not educated b.primary1-7 c.senior1-4 d. senior 5 and above
5. Monthly income in shs _____
6. Relation of the care taker to the child
- a. parents b. grandparents’
- c. guardian d. others (specify)

III Clinical data

1. Cause of burn trauma
- a. Scald b. Flame
- c. electricity d. chemical agents e. others (specify)
2. Place of injury or setting of injury: a. home b. school c. others (specify)
3. Anatomic location/s of the burn
- a. upper extremities b. lower extremities e. abdomen
- c. trunk d. head f. perineum g. face and 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 in home 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 stay _____

10. Month at which the child sustains injury _____

11. is the injury intentional or non-intentional _____

12. If the injury is intentional was it a. immersion b. pouring c. other (specify)

13. Any concomitant medical condition of the child

- a. epilepsy
- b. diabetic mellitus
- c. down's syndrome
- d. others (specify)
- e. none

14. Clinical presentation at the time of admission

- a. airway compromise
- b. shock
- c. arrhythmia
- d. loss of consciousness
- e. others (specify)
- f. none

15. Outcome of a child who had sustained a burn injury

- a. recovery without any complication
- b. contracture
- c. death
- d. scarring or disfigurement
- e. if other specify

Appendix 4: Work Plan

ACTIVITY	NOV-DEC	JAN-MARCH
Writing proposal		
Data collection and analysis		
Writing the final report		

Appendix 5: Estimated Budget

SN	Activity/ Items	Unit Cost (Ugshs)	Quantity	Total Cost (Ugshs)	Justification
1	Stationary and technical materials				
	Duplicating paper	15,000	1 Reams	15,000	Printing questionnaires & binding of research write ups.
	Printing & Binding	30,000	3 Copies	90,000	
	Note books & pens	5,000	5	25,000	
	Internet subscription	25,000	1months	30,000	Obtaining information necessary in research writing
	Sub Total			160,000	
2	Data collection				
	Research assistant	30,000	2	60,000	To help in data collection
	Sub Total			60,000	
3	Other Fees				
	Dissemination of Research Results			150,000	
	Miscellaneous			50,000	
	Sub Total			200,000	
	Grand Total			420,000	

Appendix 6: Introductory Letter



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www.kiu.ac.ug

**OFFICE OF THE DEAN
FACULTY OF CLINICAL MEDICINE & DENTISTRY**

26/02/2018

TO WHOM IT MAY CONCERN

RE: ATYAM ARTHUR (BMS/0281/123/DU)

The above named person is a fifth year student at Kampala International University pursuing a Bachelor of Medicine, Bachelor of Surgery (MBChB) Program.

He wishes to conduct his student research in your community.

Topic: Prevalence of burns at Kiryandongo general Hospital from January 2018 to March 2018.

Supervisor: Dr. Kakunguru Edward

Any assistance given will be appreciated.

S-O Akib
Dr. Akib Surat O
Assoc Dean FCM&D



A card in the necessary assistance.
Akib Surat O
MEDICAL SUPERINTENDENT
Kiryandongo Hospital
13 APR 2018
P. O. Box 128, Kigumba

"Exploring the Heights"

Assoc. Prof Ssebuufu Robinson, Dean (FCM & D) 0772 507248 email: sssebuufu@gmail.com
Dr. Akib Surat Associate Dean FCM & D) email: doctorakib@yahoo.com

Appendix 7: Map of Kiryandongo District



Appendix 8: Map of Uganda

