PATTERN OF BURNS AS SEEN AT THE KENYATTA NATIONAL HOSPITAL

A DISSERTATION SUBMITTED AS PART FULFILMENT FOR THE DEGREE OF MASTERS OF MEDICINE (SURGERY) OF THE UNIVERSITY OF NAIROBI.

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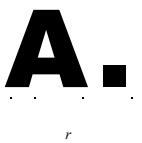
Sign:  Hate

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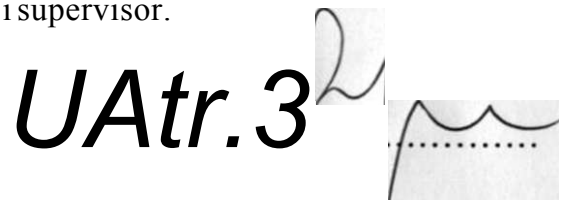

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DEDICATION

I dedicate this book to my late brother;
Tony T. Buni
Who departed at the hour of great need.
His inspiration will always remain the source of my strength.

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LIST OF ABBREVIATIONS

AUBMC	-	American University of Beirut Medical Centre
BSA	-	Body Surface Area
BWT	-	Body weight
CO	-	Carbon Monoxide
G	-	Gram(s)
HDU	-	High Dependency Unit
ICU	-	Intensive Care Unit
Kg	-	Kilogram(s)
KNH	-	Kenyatta National Hospital
Mg	-	Milligram(s)
MMol	-	Millimole(s)
RTA	-	Road Traffic Accident
TBSA	-	Total Body Surface Area
UON	-	University of Nairobi
V	-	Volts
WHO	-	World I lealth Organization
Wt	-	Weight
Yrs	-	Years

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SUMMARY

This was a hospital based descriptive prospective study of patients admitted to KNH with burns between 15lh January 2005 and 14th June 2005.

A total of two hundred (200) patients were recruited in the study. Their age, gender, occupation, place of accident, marital status and causative agent of burn were determined. Assessment of the level of injury was done.

Data was entered in a designed questionnaire and analysed.

From the data, burns were more common in children especially those less than ten (10) years (60%). The mean age of the patients recruited in the study was 12.5 years. There was a slight male preponderance with a ratio of 1.06 : 1.00.

Most patients were single and most burns tend to occur in the home of the patients (84.5%). Most burns were accidental 84%.

Thermal burns were the commonest (96.0%), followed by electrical burns (3.5%) and chemical burns (0.5%). Scald burns contributed 54% of the thermal burns.

Most patients were admitted with 2nd degree superficial bums. The mean Body surface area (B.S.A) affected by burns in this study was 19.2%,

with a range of 1% to 85%. Burns tend to involve the trunk more than any other body part.

Epilepsy and alcohol intoxication in adults were noted to be the most common predisposing factors.

Burns are common, they affect children more than adults, with a slight male prepondarance. Scald burns are the commonest type of burns. They are mainly accidental and they tend to occur within the homes of the patients.

INTRODUCTION

A bum is a coagulative destruction of the surface layers of the body caused by dry and wet heat, chemicals, ionizing radiation, electromagnetic radiation or electric current.

Pathophysiology

The skin is the largest organ of the body and it accounts for about 16% of the total body weight, in different regions of the body it varies in thickness, colour and presence of hair, glands and nails. These variations reflect different functional demands. The basic structure of the skin is however the same in all the body regions and it consists of the following:

(i) **Epidermis;** Outermost layer, composed of keratinised squamous epithelium.

(ii) **Dermis;** This is the middle layer, composed mainly of connective tissue and it contains capillaries that nourish the skin, nerve endings and hair follicles.

(iii) **Hypodermis;** This is a layer of adipose and connective tissue between the skin and underlying tissues.

Hair follicles, sweat glands, sebaceous glands and nails are epithelial structures termed as dermal appendages since they originate during embryological development from down growths of epidermal epithelium into the dermis and hypodermis [1].

The skin has 4 (four) major functions

(i) Protection

It protects the body against ultraviolet light, mechanical, chemical and thermal insults. Being relatively impermeable it prevents excessive dehydration and acts as a physical barrier against invasion by micro-organism.

(ii) Sensation

The skin is the largest sensory organ. It contains a variety of receptors for touch, temperature, pain and pressure.

(iii) Thermo regulator

Excessive heat loss is prevented by the presence of hairs and subcutaneous adipose tissue. Heat loss is facilitated by sweating and increased blood flow through the rich vascular network of the dermis

(iv) Metabolic functions

Vitamin D is synthesized in the epidermis; hence extensive damage to the skin will have a wide range of effects. Tissue necrosis is directly related to the temperature of the burn causing agent and the duration of contact. Tissue damage is seen at temperatures above 45°C but it should be

remembered that chemicals and electricity could also cause burns, where the extent of tissue damage will be affected by other factors.

Immediately a burn is sustained there is release of a series of mediators, which include: Vasoactive amines, prostaglandins, thromboxanes, leukotrienes and free oxygen radicals. These results in increased capillary permeability, which peaks at 8 hours and lasts 48 hours [2,3,4].

The capillaries leak water, electrolytes and albumin (proteins with molecular wt <350 kd). The plasma loss results in increase in viscosity of blood.

The immediate response is followed 6 hours later by delayed response, which is characterized by venular dilatation and further capillary permeability. At the same time there is platelet and polymorphonuclear leucocytes adheration to damaged intima at burns sites, which might lead to micro thrombosis. Red blood cells damage results into haemoglobinuria, which may damage kidneys. Cortisol levels are increased after burns resulting into hyper catabolic state. There is also increase in metabolic rate and nitrogen and energy loss through heat and water losses.

CLASSIFICATION

This is based on the depth of the burn. The depth of the burn may be difficult to ascertain on the initial examination, as devitalised tissues may appear viable some time after injury: hence, serial examination of burn wounds is very useful.

A burn depth is classified as:

(a) First degree burns

These are superficial burns involving the epidermis only and which heal within 7-10 days. There is no scarring.

(b) Second degree burns (Partial thickness)

J^js type of burns are often red, wet and very painful. They vary in their depth and ability to heal and are sub-classified as:

(i) **Superficial second degree** - The epidermis is lost with varying degrees of dermis. May heal within 14-17 days

(ii) **Deep second degree** - There is deeper dermal destruction and is insensitive, healing occurs in 14-21 days. There is a propensity of forming hypertrophic scars.

(c) Third degree burns (Full thickness burns)

There is total destruction of the dermis and healing is very slow with a lot of scarring.

(d) Fourth degree burns

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Involves subcutaneous tissue, tendons or bones.

EXTENT OF BURN

The more body surface area (B.S.A) is involved in a burn, the greater the morbidity and mortality.

Therefore, accurate estimation of burn size is important in the management of patients with thermaf burns. A number of ways have been designed to estimate the extent of burns.

(i) An individual's palmar surface represents 1% of the T.B.S.A [9]. Hence a simple method to estimate the burn extent is to use the patient own palmar surface to measure the burnt area. However this is not an accurate method.

(ii) "Rule of Nines" method is an easy and quick way to estimate the B.S.A involved in burns. Each lower limb is 18%, the trunk is 18% each side, each upper limb is *9%* and the head and neck is 9% and 1% for the perineum. However in children , the head covers a high percentage than in adults, hence the Rule of Nine is inaccurate [10]

(iii) Lund and Browder chart:- Lund and Browder described a method to compensate for the difference in adult and children and came up with a Lund-Browder chart. This is the most appropriate method for assessing burns in children.[0]

TYPES OF BURN

1. FLAME

Occur when there is contact with an open flame. Most of the times it is associated with use of accelerants e. g. kerosene. Flame burn usually

result into deep-dermal and full thickness burns especially when flames ignite clothing.

2. **CONTACT**

Result from direct contact with a hot object like an iron box, cooker, hot plate, and cigarettes. Injury is confined to the point of contact and is usually deep dermal or full thickness.

3. **SCALD**

These is burn which result from contact with hot liquids. The more viscous the liquid and the longer the contact with the skin the deeper the damage. Scalds can result from either splashes or immersion. Immersion injuries tend to be deeper with a line that marks the liquid level

Splash burns tend to form a pattern with bums separated by patches of uninjured skin. This includes burns due to hot tea, porridge or water.

4. STEAMS

This mostly occur in industrial and automobile radiator accidents

5. **ELECTRICAL BURNS**

Electrical injuries range from very mild to very severe injuries.

Electrical injuries can be:

a) **Electrical flash burns**

The flash produced during electrical shock has a temperature of about 4000°C and this usually causes superficial burns since they last for a short period of time.[,3]

b) **Low voltage burns**

These are household electrical bums, due to household electrical accidents.

c) **High voltage burns (440v- 1000v)**

These are injuries caused by electricity at a range of 440-l000v.[14]

d) **High-tension voltage burns**

These are caused by voltages more than lOOOv. [,5]

Electricity involves the flow of energy (electrons) along planes of least resistance, i.e. blood vessels, muscles, towards the natural ground. The skin acts as a resistor to flow. Dry normal skin has a resistance of 25,000 ohms, while in wet skin resistance is reduced up to 1500 ohms. Alternating current produces tetany in all muscles stimulated, but it is more in flexor muscles, leading to a "locked on phenomenon". This increases the length of time the current passes through the body.

Direct current tends to produce a single large muscular contraction that often throws the individual away from the source. Electrical injury may

cause disruption of the body's normal electrical activities leading to neurological and cardiac dysfunction. As the electricity flows in the body it produces heat, which can cause devastating injuries to the tissues.[16]

6. CHEMICAL BURNS

These are primarily grouped into acid and alkali burns. While evaluating the patients it is important to note the composition of the agent, type of exposure, duration of exposure and other events or injuries associated with the burn.[17]

Acids with a PH lower than 2 cause coagulative necrosis by denaturing proteins upon contact with tissues. This limits penetration of acids into the tissues. However, hydrochloric acid produces a liquefaction necrosis similar to that of alkalis.[18]

Alkalis liquefy tissues by saponification of fats and denaturing of proteins leading to liquefaction necrosis. Due to this liquefaction, alkalis can continue to penetrate very deeply into tissues unlike acids. [18]

LITERATURE REVIEW

According to the World Health Organisation (W.H.O), trauma kills more than five million people worldwide each year and accounts for nearly one of every ten deaths globally. Tens of millions of people visit emergency departments all over the world annually due to injury, either unintentional e.g. R.T.A, drowns, falls or burns - or intentional following assault, suicide*or war related violence. Injuries affect people of all ages and socio-economic status. In the injury chart book of W.H.O, of the five million people killed due to injuries in the year 2000, burns were responsible for the death of approximately 238,000 people [19]. In addition to the deaths, millions are wounded or suffer other non-fatal health consequences due to injuries. The magnitude of the problem varies considerably with age, sex, region and income group.

The treatment of burns has been an object of great concern ever since man discovered fire, in view of the high mortality and the severe sequelae of fire accidents. Prevention of burns is only possible when the risk factors are known. The importance of the problem is shown by the high number of studies which have since been done.

In a retrospective study by Pardo'[20]' at Contro de Quemochos Hospital General in Spain from 1989 - 1991, 265 patients were seen. Of the 265 patients 180 were males (67.55%) and 85 females (32.45%). The incidence of burn injuries was found to be high in unmarried males and in married females and occupational bums were more often in males.

Fire was the most common agent in males and scalds in females. The lower extremities were the most commonly involved in females.

Haberal[21] did a retrospective study of 1005 patients admitted at Turkish Transplantation and Burns Foundation over a period of 12 years. Of these patients, 66.3% were males and 33.7% females. Flame injuries and scalds accounted respectively for 52.5% and 44% of the injuries. Pegg[22] in 1978 found a sex ratio of 71.3% males to 28.7% females in a study on burns in Australia. The predominance of males in this case was probably due to the higher incidence of burns in industry. In a study on burns in childhood in Australia, published in 1978 by Joseph et al[23], 60.8% of cases concerned males and 39.2% females. However Boyhard et al[24] in a study on burns in Algeria published in 1978 reported that the number of females was twice of males: 65% and 35% respectively, the predominance of females was evident in the 16 to 40 years age group.

In a study by El-Sonbaty[25] in Egypt, males and females were equally affected; children were involved in 50.0% of cases. Ramirez[26] retrospective study at Philippine General Hospital found the majority of patients to be in the younger age group (0-10 years: 36.17%) with a male predominance. Flame burn was the commonest. Benito Ruiz[27] reported a retrospective study of 710 patients admitted into the Burns Unit of La Fe Hospital between 1985 and 1988. The average age of the patient^ was 24 years, and 66% were males, Burns were more frequent in children aged less than 10 years, especially those due to scalding by hot water. Nearly 47% were children under 15 years old. The two leading causes were scalding and flames. Other significant causes were gunpowder and electricity. In Iliopoulos[28] study of 800 burn patients admitted at Kat-Kaffisia Hospital in Athens, Greece in the period 1983 - 1987, male burn patients outnumbered the female. The largest group of patients were comparatively younger, 103 cases in the group of 20 - 30

years, 166 cases in the group of 30-40 years. However this centre treated patients over 15 years of age only.

Between 1982 and 1987, a statistical analysis of 330 burn patients admitted at the America University of Beirut Medical Center (AUBMC) was conducted by Jiz et al[29]. In this retrospective study, the male to female ratio was 2:1. The distribution of cases according to age was nearly the same for the 0 - 14 years age group (36.4%), the 15 - 29 years age group (32.2%) and for the above 29 years age old (28.4%). The highest number of patients was in the 0 - 4 years age group (21.2%) probably because of referral to AIJBMC which is one of the very few hospitals capable of handling paediatric bum cases in Lebanon. More than 80% of the patients in this category sustained their burns by hot fluids.

In a study by Fadaak[30] at King Saud Hospital, Saudi Arabia, over a period of 3 years from 1991 - 1994, 116 patients were admitted. Eighty-seven (75.0%) were males, forty (34.5%) were children under the age of 5 years and 8 patients (6.9%) were age 5 - 18 years. The mean age was 13 years (range 2 months - 75 years); only one patient over the age of 60 was admitted. Flame bums were responsible in 55 patients (47.4%), scalds in 48 (41.4%), electrical bums in 15 (12.9%) and chemical bums in two patients (1.7%). Bumed BSA ranged from 2 to 80%, the majority of the patients (74-63.8%) presenting less than 10% TBSA.

In a similar study conducted by Subrahmanyan[31] at General Hospital Miraj in India, a total of 254 bum patients treated during the period July 2001 - June 2002 were analyzed. Of these, 158 were female and 96 males. The age of the patients ranged from 3 to 60 years. The extent of

the burns ranged from 3 to 100% TBSA. The causes of the burns were flame in 228 cases (89.7%), scalds in 11 (4.3%), electricity in 6 (2.4%), chemicals in 6 (2.4%) and other causes in 3 (1.2%) cases. In this study the number of females involved was more than that of males unlike in most of the other studies conducted. This was conducted in a rural District Hospital in India; this excluded the element of industrial accidents which are responsible for most burns in males.

Work done in Kenya includes that of Wanjeri'[32]' at Kenyatta National Hospital in 1995, where 347 patients with burns were recruited. In the study 144 (41.5%) of the patients were females and 203 (58.5%) were males. While 247 (71.2%) patients were < 2 years old and out of these 146 (59.1%) were males and 101 (40.9%) were females. In another study done at the same centre by Nthumba'[33]' in 2002, 1157 burn patients admitted between January 1999 and December 2000 were analysed. 601 (51.94%) were males and 556 (48.06%) were females, giving a male to female ratio of 1.08 to 1.00. The average age of patients was 11.78 years. The youngest was 0.08 years. This picture was similar to that found in studies done in most parts of the world, which had shown a male predominance.

Burns affect also the extremes of age, the young and the very old with grievous outcome. The pattern of burns in this age group is different from that in the other age groups. Banquart[34] did a survey of 22 burned children treated in the hospital Maria Pia, in Portugal between February and August 1999. The ages ranged from 13 months and 12 years (mean age 3.7 years). The place of accident was home in 21 cases (95.45%) and school in one case (4.55%). The burn agent was boiling water in 15 cases (68.2%) and contact with hot surface in 3 casps <13.2%), boiling oil in

two (9.1%) and low tension electricity in the remaining two (9.1%). The average total B.S.A was 4.1% (range 1 to 12%).

In another study of burns in children by Benito[35] at Hospital La Fe, Spain, an analysis of children admitted with burns for a period of 4 years, was made. Children under 5 years were at more risk (69%), especially from birth to 2 years old (46%). Scalding was the leading cause of thermal injury, accounting for 61% of the thermal burns, 40% of children had full thickness burns. Most of the accidents occurred in an indoor setting, but the older the child the fewer accidents at home and the more accidents in the streets. Males outnumbered females in all age groups, and the male to female ratio was 1.5:1.

Burns occurring in the geriatrics age group also deserve a mention. Dorland'S illustrated Medical Dictionary defines geriatrics (from the Greek geras = ageing and iatrike = medicine) as the branch of medicine deals with the problems of old age and ageing, including the clinical problems of senescence and senility. D'Arpa'[16]' conducted a retrospective study of elderly burn patients admitted at a hospital in Palermo, Italy, during the period 1975 - 1991. The highest percentage of accidents occurred at home (86.99%) while burns at work place accounted for 6.9%, and fire was responsible for 71.4% of the cases.

In a study by Iliopoulos[37] at KAT District Hospital, Athens, Greece, 185 patients aged over 65 years, who had sustained burns were analyzed. In the majority of cases the aetiology was thermal injury (Flame 63%, scalding 19%, contact 10%, friction 5%, chemical burns 3%). Over one-third of the accidents occurred in a closed environment and were

domestic. Inhalation injury was present in 23% of the patients and it had a mortality of 100%, the overall mortality was 33%.

Burns have a variety of causes: chemical, thermal and electrical. It can occur as a result of domestic or industrial accidents. Majority of burns result from domestic accidents and are preventable. Burn injuries related to domestic fires have been well reported[08"39]*. Oduwole'[38]' conducted a longitudinal study of patients who sustained thermal burns from the use of contaminated kerosene, and were seen at an emergency medical centre in Lagos Nigeria, over a period seven weeks between October and November 2001. A total of 139 patients were seen, of these 83(59.7%) were females and 56(40.3%) were males, while 46(33.0%) were children and 93(67.6%) were older than 15 years. Most of the burns (96.4%) resulted 4Vom use of hurricane lamps. The mean burn surface area was 21.3%, and the upper limb was the most frequently affected region of the body. Major burns occurred in 86 patients (61.9%), of which 18 died giving a case fatality rate of 12.99%.

Kin-long Chen[(39)]

reports of burn injuries caused by the flames of liquid - alcohol - burning chafing - dish stoves, during the period 1989 - 2000 at a Chinese Hospital. A total of 1856 burn patients were admitted in the unit, and* of these 169 (9.1%) had flame burns caused by an alcohol-burning chafing-dish stove. The age distribution was, 105 (62.1%) were adults, 23 (13.0%) were elderly and 42(24.9%) were children. The distribution of cases in relation to body surface area (BSA) involved was 108 cases (63.9%) with BSA burn of 0.5%, 46(27.2%) with 6 - 10% BSA burn and 15(8.9%) with 11% BSA burn. These burns are reported to be high during the cold seasons, since most Chinese people like to eat very hot dishes.

Ugburo[40] reports of 94 patients admitted to a hospital in Lagos, Nigeria after sustaining flame burns resulting from explosions of kerosene contaminated with petrol, between October and November 2001. A total of 58 families were involved with multiple family members affected. The incident was later discovered to have been due to contamination of keroserte from a storage tank at a fuel depot. Most accidents occurred while people were trying to refuel a lighted lantern. The ages ranged from 3 weeks to 55 years. Many of the patients suffered severe burns with a moan percentage B.S.A of 37%. A significant percentage of burns were full thickness. The right upper limb holding the lantern was usually more severely affected than the left in the person refueling the lantern. The incidence of inhalation injury resulting from inhaled kerosene and smoke was 37% of all the patients.

Howeter, in the younger age group, scald burns appear to be much more common.

Zaidi[41], in his prospective study of 250 burned children admitted to a plastic surgery centre in Tripoli Libya in 1992 found scalding to be the main cause of burns. The majority of burns occurred in the house and in the presence of parents. Most of the burns occurred in the cold season from November to May, and the majority of patients belonged to large families with more than three children. Reig[42] did a retrospective study of patients under the age of 16 years with scald burns admitted to Hospital La fe in Spain between 1988 and 1989. Of the 3711 patients treated, 302 (8.1%) were hospitalized, of the latter 92(30.4%) were below 16 years of age. Scalding was the cause of burn in 54 patients (58.7%), 72.2% were under 6 years of age. The mean burn B.S.A. was 13.2% and the most commonly affected region was the upper limbs (51.8%). Over 90% of the accidents occurred at home.

Chemical burns are relatively infrequent. Social development and industrialization influence the type of corrosive involved. Industrial accideys, which constitute a major proportion of cases in the developed countries, are but a small case group in the rest of the world. Sinha et-al[43] presented their experience with chemical burn^ over eleven years at Banaras Hindu University Hospital in India. In there study 59 patients with chemical burns were admitted; they constituted 4.7% of all bum admissions. Most cases were intentionally inflicted with acids, following a dispute. The patients were in their second, third or fourth decades and ocular involvement was common (30.5%). Hydrotherapy was the mainstay« of first aid and casualty department care.

Da Silva's[44] study at a hospital in Lisbon, Portugal between May 1998 and May 1999 captured 30 patients with chemical bums. The average age of patients was 43 years, and 63% of the patients were male. Most accidents were work-related (57%) and the commonest agents were hydrofluoric acid and caustic soda. The commonest site of injury was the upper limb, especially the hand. Ten patients were washed with water immediately after the accidents. Chemical burns were smaller than 1% and second degree.

In 2001, Bari[45] did an analysis of chemical burn in Bangladesh. Acid burns constituted 8.76% of all the burn cases treated. Most such cases were of intentional origin (attempts to disfigure the face, eyes, nose, and genital organ). Young girls were common victims and the incidence was greater in rural than in urban areas.

On the other hand, electricity is one of the necessary requirements for human survival. However, when misused, it can lead to a life spent as a cripple or cause a fatal injury. In the developing countries, electrical energy is used widely but sometimes inappropriately. For this reason, the incidence of electrical injury causing severe complications or death is high.' Haberal'[46] presented a paper on their eight years experience with electrical burns in Turkey. Between 1980 and 1988 electrical burns were responsible for 16.9% of all burns, not including flash burns. Of these patients 68% were over 15 years while 32% were under 15 years old, while 89% were males and 1 1% females. Low voltage (220-400 volts) current was responsible for 38.6% of the burns, whereas high tension (1000-134000 volts) current was responsible for 61.4% of burns. The occupations of the over 15 years were, 42.4% electricians, 23.5% blue collar workers, 10.6% farmers, 7.4% teachers, 16.1% others (students, pharmacists, shoemakers).

Essendero',[7] did a retrospective study of seventy patients admitted with high tension electrical burns at a General Hospital in Barcelona, Spain, between 1980 and 1988. There were 69 males and 1 female with an average age of 31 years. Most of the accidents (55.7%) occurred at work and 44.3% occurred in leisure time. The extremities were the most frequent sites of injury and ir, 77% of the cases two or more extremities were burned. 43% sustained additional flash burns.

In 1992 Lochaitis[48] did a retrospective analysis of 24 patients who suffered low and high voltage electrical injuries during a 2 year period between 1989 and 1991. The male to female ratio was 23:1 and the majority belonged to the 40 - 50 years age group, most of the patients (58.3%) had high tension electrical burns. The area most commonly

injured was the upper extremity followed by the lower limbs, head, and thorax.

Later on Subrahmanyan[9] studied a total of 40 patients with electrical burns treated at General Hospital, Sanglia, India between January 1999 and December 2000. In this study, electrical burns were responsible for 2% of all bum admissions, 67.5% of the burns were due to low voltage and 32.5% due to high voltage. The extremities were involved in 52.5% of the patients and the mortality rate was 25%.

Nthumba[33], in his study of 1,157 burns patients treated in Kenyatta National Hospital, found that 2 patients had chemical burn injuries, 14 patients had electrical burn injuries, 1 patient had frictional burr and the rest had thermal burns.

Epilepsy on the other hand is an important predisposing factor in burns. The burns agent, if fire or some incandescent material, can trigger an epileptic seizure because of the light stimuli that they emit. Epilepsy can also condition the site of the burn which in typical cases is localized in important critical areas (face, hands). Epilepsy may also lead to burns being deeper owing to the longer exposure to the burn agent as a result of the loss of consciousness during the seizure. Napoli[50], did a survey of 14 patients in the period 1975 - 1991 in Palermo Italy. Of the 14 patients; 10 were female, with a female to male ratio of 2.5 to 1. The average age was 41.1 years. The injury commonly occurred at home. The commonest site of the injury was the back of the hand or face.

RATIONALE OF THE STUDY

Bums Continue to be an important surgical problem contributing to almost 15.6% of surgical admissions in Kenyatta National Hospital. These injuries have a significant impact on survivors and their family's socioeconomic status. The lengthy hospital stays, the amount of money used in caring for burns patients strain the patients, their relatives, hosp'tal staff and the already strained hospital resources.

This study is aimed at determining the pattern and presentation of patients with burns, their causative agents, socioeconomic status and co-morbid factors.

Several studies on burns have been carried out at Kenyatta National Hospital in the near past, but this particular study will add more information on the circumstances surrounding the burns. It will add information in the determination of the causative agents of burns, the age and gender more vulnerable to burns, the site of body mostly affected by burns, the social status of the victims and the environment at which burns occur.

Prevention of burns is only possible when the risk factors are known. By determining the pattern of causative agents of burns, location of the accidents and the group of people at risk of sustaining burns intervention can be made to reduce the cases of burns. A certain number of factors can be modified by legislation and health education.

AIMS AND OBJECTIVES OF THIS STUDY

AIM

To determine the pattern of burns as seen in Kenyatta National Hospital

SPECIFIC OBJECTIVES

1. To determine burns causative agents in patients seen at Kenyatta National Hospital

2. To determine the patterns of burns distribution in relation to age and sex

3. To determine the comorbidity factors in patients with bums

DESIGN AND METHODOLOGY

This was a hospital based descriptive prospective study. Patients admitted to KNH with burns between January 2005 and May 2005 were include(>in the study.

STUDY AREA

The study was carried out in Kenyatta National Hospital.

POPULATION

(i) INCLUSION CRITERIA

All the patients admitted with burns during the defined period of the study were eligible for inclusion in this study.

(ii) EXCLUSION CRITERIA

Patients initially admitted into KNH but who were later on transferred to other.medical facilities.

SAMPLE SIZE DETERMINATION

The sample size was determined using the following formula.

$$n = \frac{Z^2 (I - p)}{D^2}$$

N= Sample size

P= Prevalence of burns, in this case it was 15%

Z= Table value for standard normal distribution at 95% confidence interval (1.96)

D= Degree of precision, set at 5%.

From the equation therefore: -

$$N = \frac{Z^2 p(1-P)}{D^2} = \frac{1.962 \times 0.15 \times 0.85}{0.5^2} = 195$$

Therefore, the required sample size was calculated to be 195 patients.

SAMPLING PROCEDURE

This was performed by consecutively enrolling patients who satisfied the selection criteria until the sample size was obtained.

DATA COLLECTION

The principle investigator did this by taking history from the patients or the caretaker. A physical examination of each patient was then conducted. The information was filled in the designed questionnaires.

DATA MANAGEMENT AND ANALYSIS

Data was entered into a computer using Statistical Package for Social Sciences (SPSS) version eleven (11). Data validation was done before analysis and analysis was done using SPSS/PC for windows programme.

LIMITATION OF STUDY

The information found depended on the history provided by the patient or caretaker and at times validation of this history was difficult.

ETHICAL CONSIDERATIONS

□A

- The study commenced after the approval by the Ethical and Research Committee of the Kenyatta National Hospital.

  Informed consent was obtained from the patients or caretakers of the patients included in the study.

- Patients or caretakers were informed of the clinical diagnosis.

- Privacy and confidentiality was maintained.

DISSEMINATION OF THE RESULTS

The results of this study were submitted to the Department of Surgery of the University of Nairobi, and copies sent to KNH Plastic Surgery Department and KNH Ethical and Research Committee.

RESULTS

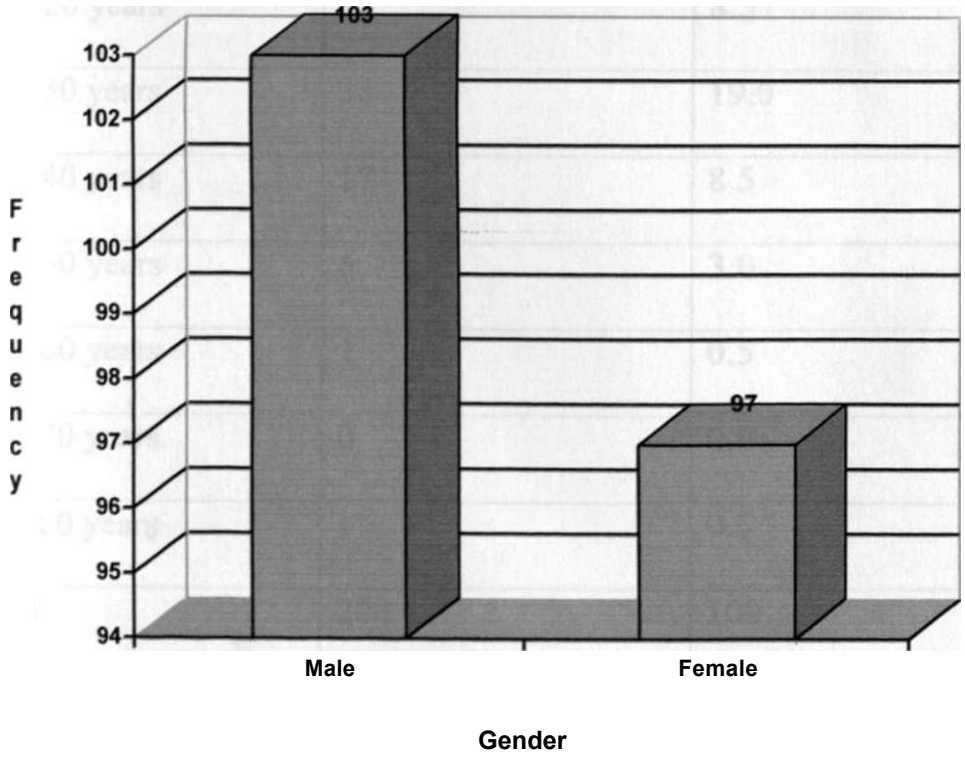
In this prospective study conducted for a duration of six (6) months from January to June 2005, a total of 200 patients (n=200) who met the criteria of inclusion to the study were enrolled.

DESCRIPTIVE ANALYSIS

Gender Distribution

Of the 200 patients, 103 (51.5%) were males and 97 (48.5%) females. The ratio of males to females was 1.06 : 1.00.

Figure 1: Gender Distribution



AGE DISTRIBUTION

The youngest in the study was 0.08 years (one month), and the oldest was 75 years. The mean age was 12.5 years. Mean age for males was 13.42 and the median was 4.5 years. The mean age for females was 11.54 years and the median was 4.0 years, 60% of patients were below the age of 10 years.

Table 1: Age Distribution n=200

Age	**Patients(n=200)**	**% Of total.**
0 - 1 0 years	120	60.0
11 - 20 years	17	8.5
2 1 - 3 0 years	38	19.0
31 - 40 years	17	8.5
4 1 - 5 0 years	6	3.0
51 - 60 years	1	0.5
61 - 70 years	0	0.0
7 1 - 8 0 year§	1	0.5
Total	200	100

OCCUPATION

Most patients were below school attending age i.e. 104 cases (52%). Only twenty percent (20%) were employed. The rest were either business people, housewives or unemployed.

Table 2: Occupations Distribution

Value	No. of Patients(n=200)	% of Total
Below school age	104	52.0
Student	26	13.0
Unemployed	11	5.5
Housewives	18	9.0
Street boy	1	0.5
Business	13	6.5
Blue Collar workers	12	6.0
Drivers	4	2.0
Saloonist	4	2.0
Cooks	3	1.5
Military officer	1	0.5
Electrician	1	0.5
Nurse	1	0.5
Cleaner	1	0.5
Total	200	100.0

ADMITTING WARDS

Of the patients admitted, sixty seven percent (67%) of the patients were admitted to the General Plastic Surgery ward (4D). While twenty eight percent (28%) to the burns unit and three point five (3.5%) percent to Intensive Care Unit (I.C.U). Only 1.5% were admitted to the High Dependency Unit (H.D.U).

Table 3: Distribution of patients admitted to each ward

Ward #	**Patients (n=200)**	**% Of total**
General plastic ward	134	67.0
Burns Unit	56	28.0
I.C.U	7	3.5
H.D.U.	3	1.5
Total	200	100.0

MARITAL STATUS

Most of the patients (79%) were not married; of these 66% were below school attending age, 16% students and 18% unmarried adults. While nineteen percent (19%) were married and two percent (2%) were either divorced or widowed.

Figure 2: Marital Status Distribution

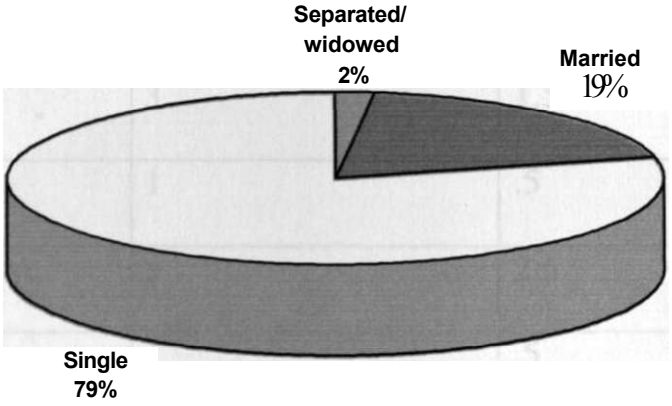


Table 4: Marital Status Distribution

Variable	Patients (n=200)	% Of total.
Not married	158	79.0
Married	38	19.0
Separated/widowed	4	2.0
Total	200	100.0

PLACE OF BURN

Table 5: Distribution of geographical place of burn

Value	Patients (n=200)	% Of total
Home	169	84.5
Factory/Industry	6	3.0
Street	15	7.5
School	3	1.5
Bar	1	.5
Neighbours house'	5	2.5
Market	1	.5
Total	200	100

DURATION BETWEEN BURN AND ADMISSION IN DAYS

Table 6: Duration between burn and admission

Value •	Patients (n=200)	% Of total
Within 24 hours	155	77.5
After **f** day	23	**11**.5
After 2 days	7	3.5
After 3, days	4	2.0
After 4 days	**1**	.5
After 5 days	3	1.5
After 6 days	**1**	.5
After 7 days	**1**	.5
After 10 (jays	**1**	.5
After 21 days	**1**	.5
After 25 days	3	1.5

Table 7: Duration between burn and admission v/s percentage of B.S.A burnt.

DURATION BEFORE ADMISSION

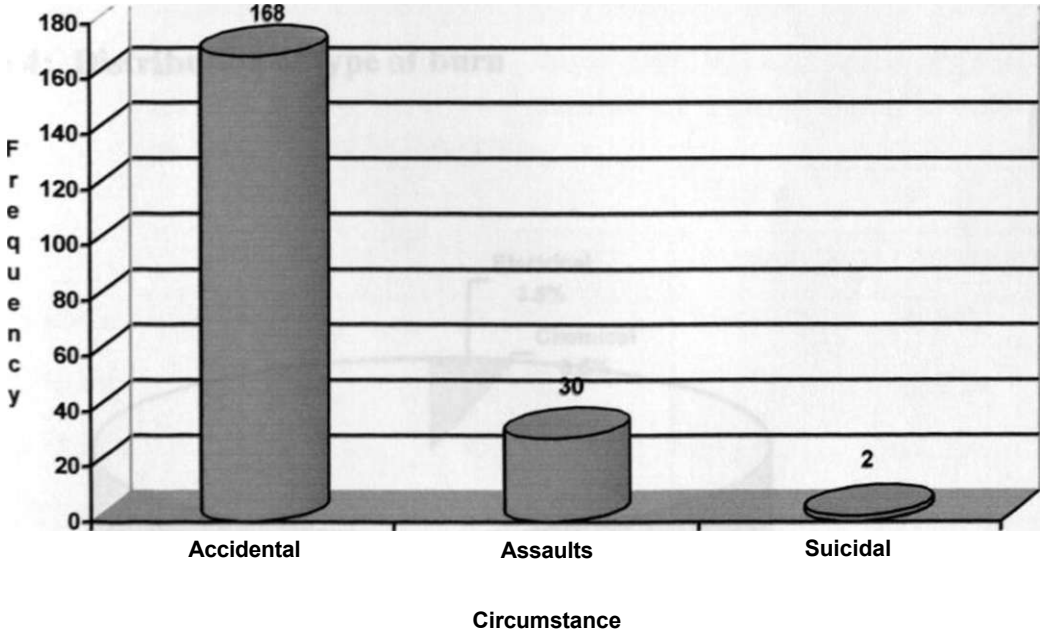
	WITHIN 24 HOURS	AFTER 24 HOURS.	TOTAL
LESS THAN 20%.	102 (69.0%)	45 (31.0%)	147 (100%)
MORE THAN 20%	53(100.0%)		53(100%)
TOTAL	155	45	200

CIRCUMSTANCES SURROUNDING BURNS

Table 8: Distribution of circumstances surrounding burns

	Frequency (n=200)	% Of total
Accident	168	84.0
Assault/homicide	30	15.0
Suicidal	2	1.0
Total	200	100.0

Figure 3: Circumstances surrounding Bums



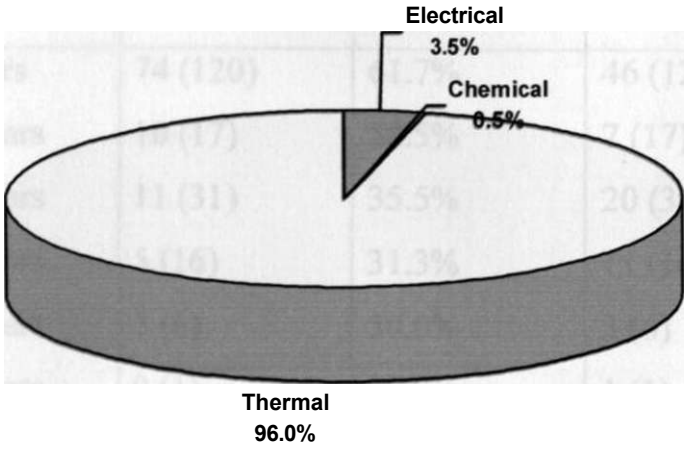
TYPE OF BURN

A total of ninety six percent (96%) of patients had thermal burns. While three point five percent (3.5%) had electrical burns and only point five percent (0.5%) had chemical burns.

Table 9: Distribution of type of burn

Variable	**Frequency (n=200)**	**% Of** total
Thermal(Wet and Dry)	192	96.0
Electrical	7	3.5
Chemical	1	0.5
Total	200	100.0

Figure 4: Distribution of type of burn



THERMAL BURNS

A total of fifty four percent (54%) of thermal burns were caused by scalds, forty six percent (46%) were caused by flames.

Figure 5: Distribution of type of thermal burns

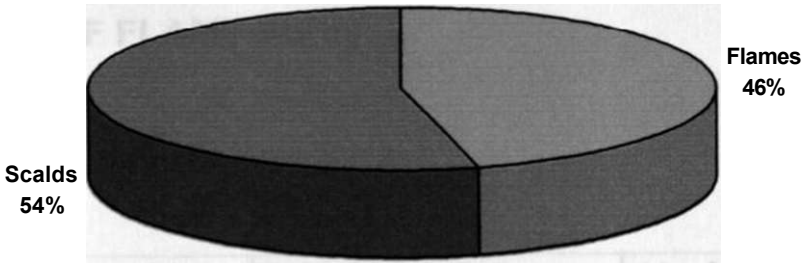


Table 10: Age versus type of thermal burn (n=192) and percentage in each age group. The total number of thermal burns in each age group is put in brackets.

	Scalds		**Flames**	
Age	Frequency	Percentage	Frequency	Percentage
0 - 10 years	74(120)	61.7%	46(120)	38.3%
11 - 20 years	10(17)	58.5%	7(17)	41.2%
21 - 30 years	11(31)	35.5%	20 (31)	64.5%
31 - 40 years	5(16)	31.3%	11(16)	68.7%
41 - 50 years	3(6)	50.0%	3(6)	50.0%
51 - 60 years	0(1)	00.0%	1(1)	100.0%
61 - 70 years	0(0)	-	0(0)	-
71 - 80 years	0(1)	00.0%	1(1)	100.0%
Total	103		89	

Table 11: Comparison of type of thermal burns in children below and over 10(ten) years old.

Age	Scalds	Flame	Total
0-10 years (n= 120)	74 (61.7%)	46 (38.3%)	120(100%)
Above 10 years.(n=72)	29 (40.3%)	43 (57.3%)	72 (100%)

NB : P-Value = 0.004.

0

CAUSES OF FLAME BURN

Table 12: Causes of Flame Burns

	Patients (n=89)	% of total
Stove/lamp explosion	25	28.0
Burnt house	18	20.0
Fell on open flames	4	5.0
Clothes caught fire	17	19.0
Mattress caught fire	2	2.0
Explosions in industries	4	5.0
Assaults by flames	19	21.0
Total	89	100.0

SCALD BURN

The commonest cause of scald burn in this study was hot water splash seen in 56.0% of patients with scald burn while hot water immersion was seen in 27.2% of the patients. The rest were due to hot oil, milk or tea.

Table 13: Causes of Scald Burn

	Patients (n=103)	**% of total**
Hot water splash	58	56.0
Hot water immersion	28	27.2
Hot oil splash	5	4.9
Hot oil immersion	5	4.9
Hot tea	6	6.0
Hot milk	**1**	1.0
Total	103	100.0

TYPE OF ELECTRICAL BURN

Out of the 200 patients in this study, 7 (seven) patients sustained electrical burns.

Table 13: Type of electrical burns

	Patients	**% of total (n-89)**
Low voltage	3	42%
High voltage	3	42%
Flash burn	**1**	**18%**
Total	7	**100%**

Only 1 (0.5%) of the patients in the study had sustained chemical burns. The burns were caused by battery aeid and they involved the face and neck.

OVERALL CAUSE OF BURN IN THE STUDY

Table 15: Distribution of Cause of burn

	No. of Patients(n=200	% of total
Hot water	58	29.0
Hot water immersion	28	14.0
Stove explosion	25	12.5
Assault by flames	19	9.5
Flames in a Burning house	18	9.0
Clothes caught fire	17	8.5
Hot tea splash	6	3.0
Hot oil splash	5	2.5
Hot oil immersion	5	2.5
Fall in open flames	4	2.0
Explosion at work place	4	2.0
High voltage electrical	3	1.5
Low voltage electrical	3	1.5
Mattress caught fire	2	1.0
Flash burns (electrical)	1	0.5
Chemical (acid)	1	0.5
Hot milk	1	0.5
	200	100

DEPTH OF BURNS:

The majority of patients in the study 111 (55%) had 2nd degree superficial burns, While 56(28%) of the patients had 2nd degree deep burns and 33(16.5%) of the patients had 3rd (third) degree burns.

Table 16: Distribution of burn depth

	No.of Patients(n=200)	% of total
Superficial 2nd degree	111	55.5
2nd degree deep	56	28.0
3rd degree	33	16.5
	200	100.0

Figure 6: Distribution of Depth of Burns

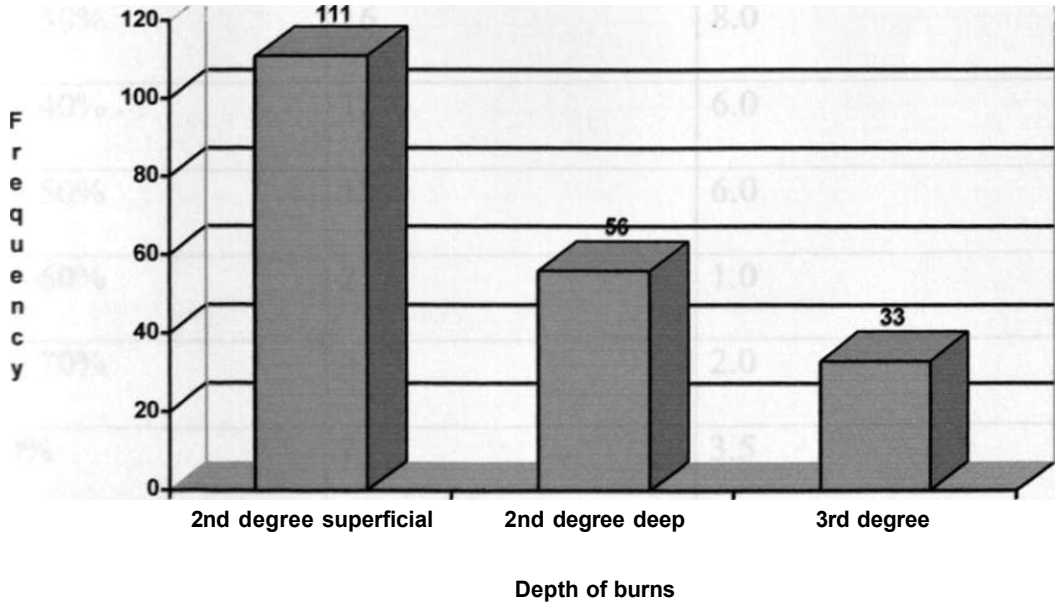


Table 17:Type of Burn v/s Depth of burn.

Type	Superficial	Deep	Total
Scald	88 (79.3%)	15(16.9%)	103
Flames	20 (18.0%)	69 (77.5%)	89
Electrical	2 (1.8%)	5 (5.6%)	7
Chemical	1 (0.9%)	0(0.0%)	1
Total	111 (100.0%)	89(100.0%)	200

p-value between scalds and flames was <0.001.

BODY SURFACE AREA BURNT(BSA)

The Body Surface Area (BSA) involved in burns in this study ranged from 1% to 85%, with a mean of 19.2% ,mode of 15.0% and median of 13.0%.

Table 18: Distribution of B.S.A involved with burn.

Value label	Patients(n=200)	% of total
<10%	87	43.5
11 - 20% •	60	30.0
21-30%	16	8.0
31-40%:	12	6.0
41-50%	12	6.0
51 -60%	2	1.0
61-70%	4	2.0
>70%	7	3.5
Total	200	100.0

Table 19:Type of Burn v/s B.S.A of body involved(mean=19.2%).

Type	<20% B.S.A	>20% B.S.A	Total
Scalds »»	100 (68.0%)	3 (5.7%)	103
Flame*	39 (26.5%)	50 (94.3%)	89
Electrical	7 (4.8%)	- (-)	7
Chemical	1 (0.7%)	- (-)	1
Total	147(100.0%)	53(100.0%)	200

NB : P-valuc for scald and flame burn was 0.0000

BODY PARTS AFFECTED

Table 20: Distribution of Body part affected

Part	
Trunk	115
Upper limbs	90
Lower limbs	65
Face and Neck	65
Head	24
Perineum	15
Inhalation	25

NB : Most patients had more than one body part involved

COMORBID FACTORS

Table 21: Distribution of cormobid factors

Value	No.of patients(n=200)	% Of Total
Epilepsy	5	2.5
Alcohol. .	12	6.0
Paraplegic	1	0.5
.	18	9.0

FLUID REPLACEMENT (Parenteral)

Table 22: Fluid replacement.

	Paticnts(n=200)	% of total
Replaced	94	47.0
Not replaced	106	53.0
Total ••	200	100.0

»

DISCUSSION

There were a total of two hundred (200) patients recruited in this study. These patients had sustained burns and were admitted to Kenyatta National Hospital during the study period from January 2005 to May 2005.

The patients aged between 0.08 years old (one month) and seventy-five (75) years. The mean age of the patients who presented with burns was twelve point five (12.5) years with a median of 4.0 years. The mean age for males was 13.4 years and the median was 4.5 years, while the mean for female was 11.5 years and the median was 4.0 years.

Majority of the patients, sixty percent (60%) were below the age of ten (10) years. This compares well with work done locally by Nthumba M. P. [33] between January 1999 and December 2000. He found the average age of patients was 11.78 years; the youngest to be 0.08 years old (one month) and the oldest was eighty six (86) years old. Wanjeri J.K.[32] study in the same institution in 1995 demonstrated that seventy one point two percent (71.2%) of patients were either twelve years or below (< 12 years).

Our local work compares well with that done by Benito R.J. et al [27] in 1990 at hospital La Fe in Spain. In this study burns were much more frequent in children less than ten (10) years though the average age of the patients "was twenty four (24) years. Nearly forty seven percent (47%) were children under fifteen (15) years old.

This study can also be compared with those done in other regions of Africa. El Sonbaty et al work at Assiut University Hospital,Egypt in 1990 demonstrated that children were involved in fifty point nine percent (50.9%) of cases.

The youngest age of patient with burns in literature is two (2) days old [51] and they have been reported in patients above eighty five (85) yrs old [37]. However burns are reported to have grievous effects in the extremes of age, hence prevention of burns at this age group is highly recommended.

In this study there was a slight male predominance with a male to female ratio of 1.06:1.00. This compares with work done by Haberal [21] in Turkey who found a male predominance, especially in unmarried male. But El-Sonbaty [25] demonstrated in his study in Egypt, that males and females were equal ly-affected by burns.

OA

However Boyhard in a study in Algeria in 1978 reported that the number of females affected was twice that of males; 65% and 35% respectively especially in the 16 to 40 years age group.

The pattern of our gender distribution could be due to:-

1) Increase in burns involving males in industrial accidents.

2) Increase in burns involving males in assaults.

3) Burns caused-by domestic accidents in single urban males.

We however predict that this trend is likely to change in the future as more females are increasingly being involved in industrial accidents and assaults and with.*the change of pattern of life more men are learning domestic duties early and this will reduce the levels of domestic accidents.

Most of our patients were below employment age. Only twenty percent (20%) of the patients;were employed in various fields. Business people formed the majority of the income earners, with six point five percent (6.5%).Majority of them run small-scale businesses. Blue-collar workers formed six percent (6.0%). Drivers and saloonist each formed two percent (2%). Nurses, electricians and cleaners each were 0.5%. while nine percent (9%) of the patients were housewives, five point five (5.5%) percent were unemployed.

In contrast a study by Haberal [46] in Turkey in 1989 demonstrated that 42.35% of the patients were electricians, 23.5% were blue collar workers, 10.6% were farmers, 74% were housewives, 7.4% teachers, 1 pharmacist, 1 engineer.

The difference in our study can be explained by:-

1) Patients employed in big organisations have a health insurance cover and 'tend to be managed in institutions other than Kenyatta National Hospital following such accidents.

2) Low level of industrialization especially in rural areas compared fo developed countries.

Most of the burns (84.5%) occurred in the homes of the patients, and they were mainly accidental, this were mainly due to scalds or open flames, while 7.5% of burns occurred in the street and these were mainly due to assaults. Only 3% of burns occurred in industries as a result of industrial accidents and 2.5% of burns occurred in neighbour's house, while only 1.5% occurred in school.

This compares well with studies done in other parts of the world, though there may be some duffeqence in the causation of burns. Benito [27] in his study at Hospital La Fe, Spain demonstrated that most bums occurred at

home and were mainly due to flames and scalds, while outdoor accidents were mainly due to improper use of gun powder and electricity (high voltage). Work related accidents occurred mainly to chemists and electricians. He further demonstrated that male outnumbered females regarding street and work related accidents.

This has been found to be true in our set up as well, in this study the majority of bums occurred in the homes, this would be explained by the fact that most burns occur in children and are as a result of domestic accidents e.g spilling of hot water. Similarly industrial bums were more common in males just like in other studies, five (5) out of the six (6) patients in the study who were involved in industrial burns were male.

Most case's in this study sustained burns following accidents. This has been demonstrated in previous studies of Wanjeri J.K. and Nthumba M.P. [33]. However there is an increase in burns caused by assaults in this study. This burns comprised up to 15% of all burns, while burns arising from suicidal attempts remain low (1%).

This is in contrast with studies done elsewhere in the world. Lochaitis [53] in a study in General Hospital Attica, Greece, showed that assaults and suicides contributed only three point nine percent (3.9%) of burns.

The increase in the incidence of assault burns in this study could be due to the increase in level of crime in the society.

Thermal burns are by far the commonest cause of burns, comprising up to 96.0% of burns. This could be due to the fact that heat is the main source of energy in our set up and most families use fire to generate heat. Only 3.5% of our patients had electrical burns while only 0.5% had chemical burns.

Scalds form the commonest cause of thermal burns comprising 54% of thermal burns, while flames contributed to 46% of burns. Scalds are much more common in children (61.7%) since they are more prone to domestic accidents especially with hot water. This explains why hot water scalds were the commonest type of burns in our study (43.0%).

In most parts of the world scald burns are by far the commonest especially in children [37,38-42].

Burns caused by kerosene stove explosion were also noted to be of increasing importance in our study (12.5%), unlike in other studies, they tend to "occur due to poor handling of the kerosene stoves and are

sporadic. In a study by Ugburo [40] in Lagos, Nigeria, stove explosion burns were mainly due to explosion of kerosene stoves caused by kerosene contaminated with petrol and they tend to occur in mass.

On the other hand electrical burns comprised 3.5% of all burns; five (5) patients were male adults, one (1) a child of 6 (six) years and one (1) adult female. Of these three (3) patients had high voltage burns, three (3) had low voltage burns, one (1) had flash burns. Of interest to note, unlike studies done elsewhere in the world, only one patient was an electrician who sustained flash burns.

Of interest is the study by Haberal [46] in Turkey, in this study, electrical burns were responsible for 16.9% of burns, not including flash burns. The majority of patients were male (89%). Low voltage was responsible for 38.6% of burns, while 61.4% were caused by high voltage. Unlike in our study electricians form the bulk of the patients (42.4%).

The difference in the pattern of electrical burns in our study could be due to:-

1) Most organisations dealing with high voltage electrical gadgets have a medical insurance cover for their workers and they tend to

take the affected patients to hospitals other than Kenyatta National Hospital.

2) Electricity is not the main source of energy in most homesteads.

3) Handling of sensitive electrical gadgets by people with little technical know how.

In our study chemicaf burns contributed to only 0.5% of burns. Only 1 (one) patient was enrolled with facial acid burns secondary to assaults. In most studies chemical burns are very infrequent. In a study by Sinha [43] in Hindu University Hospital, India. Chemical burns constituted 4.7% of all bums admission, most cases were due to acid bums secondary to industrial accidents. Level of industrialisation tends to influence the level of chemical bums. This could explain the low incidence of chemical bums in our study, plus the fact that most industries send their patients in hospitals other than Kenyatta National Hospital.

Most patients, this is fifty five percent (55%) had 2^{nd} degree superficial bums, twenty eight percent (28%) had second (2^{nd}) degree deep bums, while sixteen point five percent (16.5%) had third (3^{rd}) degree bums. Scald bums tend to cause superficial bums, while flame bums and electrical bums cause much deeper bums (Table 16), the p-value was <0.001, this was significant, thus patients with scald bum would mostly have superficial bums. Scalds are the commonest cause of bums, and this

explain the preponderance of superficial burns. This correlates well with findings of other studies [27,4o].

BSA affected by burns in our study ranged from 1% to 84% with a mean of 19.2%, mode of 15% and median of 13%. Flame bums especially those by stove explosion and burning house were associated with a high BSA involved (Table 18), in this study flame burn was associated with high B.S.A than scalds, p-value 0.0000, this is significant. This corresponds with the work of Ugburo [40] in Lagos Nigeria, who demonstrated a mean percentage of B.S.A. burnt of 37% in Flame burn. Reig [42] demonstrated at hospital La Fe in Spain the mean bum B.S.A. to be 13.2%, and the most commonly affected body part was the upper limbs (51.8%). In our study the site commonly affected by bums was the trunk, involved in 115 cases, the upper limbs involved in 90 cases, then the lower limbs and the face and neck each involved in 65 cases. The head was involved in 24 cases, and the perineum in only 15 cases. This is due to the spills which tend to affect the trunk more.

Benito et al [27] demonstrated almost the same pattern in his study at hospital La Fe Spain. The trunk was commonly involved in thermal bums, followed by the upper limbs.

The extent of B.S.A burnt had an association with the duration of time before presentation to hospital. In this study patients with more than 20% B.S.A burnt presented within 24 hours after burn.

Of the 200 patients in this study, 18(9%) of the patients had comorbid factors, which contributed to the occurrence of burns. Of these 12 (6%) of patients were under influence of alcohol. Alcohol is associated with reduction in concentration and judgement, this could have contributed to the occurrence of burns in patients intoxicated with alcohol. On the other hand 5 (2.5%) of the patients were epileptic and were reported to have had an epileptic fit which contributed to the occurrence of burn. This patients tend to fall on open flame, most of them sustained deep facial burns. Only 1 (one) patient was a paraplegic who had sustained burns after his house caught fire and he could not escape due to his state.

Of the 200 patients in this study, 25 (12.5%) had inhalation burns. These are patients who had sustained facial burns, and those who sustained burns in enclosed environments. The commonest agent involved here was flame burns ?nd hot water immersion bums.

Parenteral fluid replacement was given to 47% of cases. This was calculated as per Parkland formula and was determined by the depth of burn and TBSA involved in bUrns.

CONCLUSIONS

1) Burns are common at Kenyatta National Hospital, and they tend to affect children especially those below ten (10) years old.

2) Males were affected by burns slightly more than females in this study.

3) Most patients affected by burns are unemployed (80%) or are low-income earners if employed. Hence these injuries strain their little available resources.

4) Most burns are accidental; however there is an increase in burns caused by assaults in this study compared to previous studies. This could have been contributed by the rise of social crimes.

5) Thermal burns are the commonest type of burns. Scalds by hot water is the leading cause of thermal burns and Kerosene stove explosion burns are on the increase and they are probably caused by poor handling of the stoves.

6) Epilepsy and Alcohol intoxication are important predisposing factors.

RECOMMENDATION

- As most bums tend to occur in children, there is a need for parents/guardians to ensure that safety precautions within the house are maintained. Children should never be left on their own especially when there is hot water or open flames.

- There is a need for health education to the society in order to prevent occurrence of bum accidents. This can be done through the mass media and introduction of health education in schools.

- Its important for the manufacturer of cooking gadgets e.g. stoves which can cause hazardous accidents to clearly put down the operation notes to their customers to avoid misuse/mishandling of the gadgets.

- People in risky occupations should be encouraged to be putting on protective garments all the time they are on duty.

- Proper assessment of all bum patients should be conducted in order to pick up life threatening complications e.g. inhalation bums early and to institute proper management.

Epileptic patients should not be left to handle fire alone.

There is need for such a study to be done frequently to pick up any change of pattern of burn in our society and to institute relevant preventive measures.

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APPENDIX I

STUDY STATISTICAL DATA RETRIEVAL FORM: PATTERN OF BURNS - KENYATTA NATIONAL HOSPITAL

1. Demographic Data
®

Patients Name

Study No:__

IP: No:

Residence:

Age:

Sex:

Occupation:

Ward:

Marital Status: Single • Married • Divorced Q

2. Date burn occurred:

3. Place of burn:

(a) Home • (b) Factory/Industry Q

(c) School • ,# (d) Others

4. Type of Burn:

(•a) Flame Q (b) Scalds •

(c) Steam • (d) Electrical •

(e) Chemical (0 Others Specify)

Circumstances surrounding burns:

(a) Accident • (b) Suicidal

(b) Assault • (c) Others (Specify)

Thermal Burns due to:

(a) Stove explosion • (b) Burned House

(c) Hot water • (d) Hot oil

(e) Others (Specify).

Type of electrical burn:

(a) Low voltage • (b) High voltage C

(c) Flash burns

Type of chemical burn:

(a) Acid • (b) Alkali •

(c) Others (Specify)

Burns depth:

(a) Mostly superficial O (b) Mostly deep •

Percentage of bums:

(a) Up to 15% • (b) 15-30% •

(c) 30-50% • (d) 50-70% •

(e) Above 70% •

11. Body parts affected:

(a)	Head	•	(b)	Face and neck	Q
(c)	Upper limbs	Q	(d)	Trunk	•
(e)	External genitalia	Q	(0	Lower limbs	

12. Inhalation burn:

(a)' Yes (b) No ●

13. Co morbid factors (Existing illness, drug)

(a) Yes • (b) No ●

(a)	Epilepsy	EH	(b)	HIV/AIDS ●
(c)	Diabetes		(d)	CVS disease ●
(e)	Alcohol	•	(f)	Pregnant
(g)	Drugs (Specify)			

14. Fluid and Electrolyte Replacement:

(a) Yes • (b) No ●

APPENDIX II

Consent for Participation in the Study

I am Dr Buni from the Department of Surgery (U.O.N). I am carrying out a study in the pattern of burns as seen at the Kenyatta National Hospital. 1 wish to recruit you/your patient in my study, but before you participate, I will inform you about the study. The objective is to determine the pattern of burns, and the circumstances surrounding the occurrence of burns.

In this study, you will be asked questions to provide personal information and history of the injury. You/your patient will be clinically examined in order to reach the clinical diagnosis.

All the information collected will be treated with confidentiality.

I_____freely give consent of myself/proxy to take part in the study conducted by Dr Buni, the nature and effect of which he has explained to me. My participation is entirely voluntary and I am free to withdraw my consent at anytime if I so wish and this will not alter the care being given to me/my proxy. The results of this study will directly be of benefit to me /my proxy and may assist in management of patients with similar conditions at a later date.

Signature/left thumb print:

(Participant or next of kin)

Investigator:

Dr Morris Buni (Tel- 0722733583).

KUKUBALI KWA MGONJWA KUHUSISHWA KWENYE UCHUNGUZI

Mimi Dr. Buni kutoka kitivo cha upasuaji cha chuo kikuu cha Nairobi (U.O.N) nafanya uchunguzi kuhusu wagonjwa walio chomeka, katika hospitali kuu ya Kenyatta. Ningependa kukujumuisha wewe kati ya wagonjwa nitakaowachunguza, lakini kabla ya kukuhusisha, ningependa kukueleza juu ya uchunguzi wangu. Lengo la uchunguzi huu ni kuangalia kiini cha watu kuchomeka, na kinachosababisha kuchomeka.

Katika uchunguzi huu utaulizwa maswali ya kibinafsi kuhusu kilichosababisha ajali, baadaye utapimwa. Yote yatakayopatikana yatahifadhiwa kwa siri.

Mimi
nakubali kwa mimi/mgonjwa wangu kujumuishwa katika uchunguzi wa Dr. Buni, faida na madhara ya uchunguzi huu nimeelezewa . Nimejitolea mwenyewe kujihusisha na niko huru kujitoa katika uchunguzi huu wakati wowote bila kuathiri matibabu yangu/ya mgonjwa wangu. Naelewa matokeo ya uchunguzi huu huwenda yakanifaidisha mimi/mgonjwa wangu ama wagonjwa wengine wenye shida kama hii siku za mbeleni.

Sahihi/kidole Gumba

Mgonjwa/mwangalizi

Dr. Morris Buni.(Simu ya mkononi- 0722733583).

APPENDIX III

Research Approval

C K C O

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Rof: KNH-CRC01/2531

Date: 6h January 2005

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kI \ Y \ I I \ NAIIONAI. IIOSI'IIAI (PI 168/2004)

I his t> intiiini you tlcit the kenyatta National Hospital It hies and Research Committee In i icwcd ami appro* cd youi abo\e cilctl research proposal lor the period -8th January .7005 to 7ih . lamiary JiMKi. Von will be required to request for a renewal of the approval if you intend to continue with the study beyond the deadline uiven

1 >i Mu II ol ill. (oiiuuittec. I wish you fmiiful research and look forward I<> reccivini: a summat> ot the research findings upon completion ol (he study.

I Ins information will form pari ol database that will be consulted in future when processing related K-o:irch study sons it > tnmimi/c chances of study duplication

Yours sintereh.

PROF. A N GUANTAI

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' The Deputy Director (CSV KNIf
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