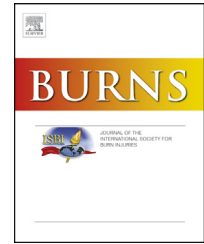


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# Risk factors for burn injuries and fire safety awareness among patients hospitalized at a public hospital in Nairobi, Kenya: A case control study

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## ARTICLE INFO

## Article history:

Accepted 8 November 2017

Available online xxx

## Keywords:

Burn injury

Burn injury prevention

Cases

Controls

Risk factors

## ABSTRACT

**Introduction:** Burn injuries are some of the most physically and psychologically devastating forms of trauma and most common injuries affecting children, especially in the home environment. They are more prevalent and are a public health problem in developing countries mainly because of poor socio-economic conditions. Effective prevention programs should be guided by the results of well-designed studies aimed at investigating risk factors for burns.

**Study objective:** To establish the risk factors for burn injuries among patients hospitalized at the Kenyatta National Hospital (KNH).

**Methodology:** This was an age and gender matched case-control study comprising 202 patients admitted with burns (cases) and 202 non-surgical patients (controls) admitted into the pediatric and medical wards. The study site was KNH, a 1800-bed national referral and teaching hospital in Kenya.

**Data analytical methods:** SPSS version 17 was used for data analysis, with descriptive statistics used for demographic data, whereas in the analysis for risk factors chi square test and odds ratio (OR) were used to determine the relationship between the predictive (risk factors) and outcome variables (burn injury). Logistic regression was used to determine the strength of association between risk factors and burn injury.

**Results:** The risk factors found to be significant for burn injuries were: low level of education ( $p=0.043$ ), use of kerosene as fuel for cooking (OR=2.027; 95% CI: 1.361-3.019,  $p=0.000$ ) and lack of knowledge of burn injury prevention and fire safety (OR=4.009; CI: 2.603-6.172,  $p=0.000$ ).

**Conclusion:** Low level of education, use of kerosene for cooking and lack of knowledge of burn injury prevention and fire safety were identified as risk factors for burn injury among patients hospitalized at KNH. These risk factors should be addressed in burn injury prevention programs for Kenya.

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## 1. Introduction

Burns are tissue injuries resulting from direct contact with flames, hot fluids, gases, or surfaces; caustic chemicals; electricity; or radiation. The skin is the body organ most commonly injured but internal burn injuries can also result from smoke inhalation [1,2]. Most burns are caused by wet (hot fluids and steam) or dry heat (e.g. hot surfaces/objects, ashes) and flames. Burns caused by hot fluids (scalds) are most frequent in children, whereas flame burns occur more frequently in adults [3-5]. Poverty and poor housing are known to be risk factors worldwide but every country has unique risk factors due to varied cultures and circumstances [1].

In the United States, burn injuries are the fourth leading cause of unintentional injury death, accounting for 3% of all injury deaths [4] and in developing countries burns are a public health issue and a major cause of injury morbidities, disabilities and deaths [6,7]. 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, the World Health Organization (WHO) recognizes these injuries as a serious public health problem worldwide. 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, suffer from adverse psychological effects and are oftentimes stigmatized or discriminated against [1,8,9].

Studies have shown that prevention programs such as public education and improved fire safety practices in homes, offices, institutions and industries can result in prevention of burns and other injuries. Fewer burn cases translate into less morbidity and mortality, as well as huge savings in health expenditure by hospitals. In the developed world, the incidence of burn injuries has been reduced through prevention strategies including the development of surveillance systems, legislation, social marketing and advocacy [9].

The aim of this study was to determine the risk factors for burn injuries of patients admitted at a public hospital in Kenya and identify areas of intervention for burn injury prevention strategies.

## 2. Methodology

This was a case-control study whereby the cases were burn injury patients and the controls were age and gender matched patients without any injury (including burn injury) admitted into pediatric and medical wards of the Kenyatta National Hospital (KNH), a 1800 bed public hospital in Nairobi, Kenya.

The dependent (outcome) variable was the presence of burns, and the independent (predictor variables) were: occupation, level of education, knowledge of burn injury prevention and fire safety, residence (formal or informal), and type of fuel used for lighting the house and cooking.

Consecutive non-random sampling method was used to select 202 cases for the study from among patients admitted with burn injuries in the KNH burn wards, and the same sampling method was also used to select 202 age and gender individually matched controls from among patients admitted

into any of the eight medical and four pediatric wards of the hospital. Study participants were patients with burn injuries (cases) and those admitted with disease other than trauma (controls) and who gave informed consent either directly or through proxy.

All study participants had to be able to talk or there had to be a person (respondent) present to answer questions on their behalf. Consent was given by the patient or a guardian/caregiver/accompanying person in the case of minors (children aged <18 years) or difficulties in communication. The data collection instrument for both the case and controls was a pre-tested structured questionnaire. Statistical Package for Social Sciences (SPSS) version 17 statistical software was used for data analysis, with tables, graphs and charts being used to present the data. The exposure distribution among the cases was compared with the exposure distribution in the control subjects. Pearson's chi square test was used to determine the relationship between the risk factors and burn injuries, as well as comparing the two groups. The ratios from the chi square were compared using odds ratios (OR). Logistic regression analysis was used to correlate the strength of association between the burn injuries and risk factors. The confidence limit was 95% and level of significance 0.05 in all the analyses.

The study was approved by the Kenyatta National Hospital/University of Nairobi Ethics and Research Committee (KNH/UoN-ERC).

## 3. Results

A total of 404 study participants, half of whom (n=202) were burn cases, the other half (n=202) being controls, were interviewed.

### 3.1. Social-demographic characteristics

The age distribution for cases and controls was similar, due to age matching. The age range was 0.1-58 years, the mean was 15 years, the median age was 11 (10-14 years age group) and the modal category was the 0-4 years age group. The age group most affected by burn injuries therefore was 0-4 years (n=86, 42.6%), followed by 25-29 years (n=23, 11.4%), 20-24 years (n=22, 10.9%) and 30-34 (n=21, 10.4%) (Fig. 1).

More males than females sustained burn injuries up to the age of 4 years, most probably because boys tend to be more active, but thereafter, up to the age of 24 years, there were more females than males, as a result of their spending more time cooking in homes where most burn injuries occur. The number of males and females was 106 and 96 respectively for both cases and controls, giving a male to female ratio of 1.1:1.

### 3.2. Site/place and causes of burn injuries for cases

The home environment was where the majority (n=161, 80.9%) sustained burn injuries, followed by the work place (n=15, 7.5%), and only one person (n=1, 0.5%) sustained a burn in a motor vehicle, with the remainder (n=22, 11.1%) sustaining burn injuries in other places, e.g. neighbor's/friend's house or the roadside.

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