

BURNS IN CHILDREN ADMITTED AT THE UNIVERSITY TEACHING HOSPITAL OF KIGALI (CHUK), RWANDA: A DESCRIPTIVE STUDY

HP. Mugemana^{1,*}; T. Rogo, MD, MPH&TM²

¹ Department of Clinical Medicine, School of Medicine and Pharmacy, College of Medicine and Health Sciences, University of Rwanda.

² Warren Alpert Medical School of Brown University, Providence, RI, United States.

***Correspondence to Author:** Henri Paterne Mugemana.
Department of Clinical Medicine
University of Rwanda P.O. Box 7426 Kigali, Rwanda.
Email: mupater@gmail.com
Tel: + 250785657640.

ABSTRACT

Background: Burn injuries are responsible for high rates of mortality and morbidity in the pediatric population particularly in developing countries. However, there is a lack of published data on pediatric burn injuries in Rwanda.

Objectives: This study aimed to describe burns in children admitted at the University Teaching Hospital of Kigali.

Methods: This was a retrospective review over a 1-year period from June 2014 to June 2015 with data retrieved from the case-files of the patients.

Results: The total number of children with burn injury admitted was 72. Males predominate with 63.9% of all cases. Three-quarters (77.8%)

were aged 3 years and younger. Scalds were by far the commonest type of burn occurring in 93% of the patients. Partial thickness burns accounted for 91.7% of cases. The average length of hospital stay was 20.9 days and the mortality rate 16.7%. Total Body Surface Area (TBSA) burned greater than 25% and full thickness burns were associated with mortality.

Conclusion: Scalds were the most common type of burns in this population. Mortality was higher than reported in studies from other developing countries. Improvement in household safety, promotion of early consultation and raising the awareness of the community through public health campaigns could positively reverse the trends.

Keywords: Burns, Child, Pediatrics, Inpatients, Rwanda.

INTRODUCTION

Burns are a major global public health problem and rank fourth amongst the most frequent type of trauma. In children aged 1 to 9 years-of-age, burns are the 11th leading cause of mortality [1]. Given the paucity of specialized burn centers and trained personnel, the burden in low-income countries, including Rwanda, is quite considerable and accounts for over 95% of worldwide fire-related burns [2].

The pediatric population is more vulnerable to burns due to natural curiosity, exploration of surroundings and unawareness of danger [3]. Consequences range from physical to psychological harm and area burden not only to the child and the family, but also to the health-care facilities as well. Scald and contact burns are more common in younger children whereas electrical injuries are usually observed in older children and adolescents [4]. These injuries mostly take place at home [5].

Published studies have identified specific risk factors and led to adoption of preventive measures like smoke alarms, sprinkler systems, and anti-scald devices among other things that reversed the trends, at least in the high-income countries [6]. There have been studies done in other East African countries like Kenya, Uganda and Tanzania [7-9]. However, there are no published data in Rwanda. Therefore the purpose of this study was to describe burns in children admitted at the largest tertiary referral facility in Rwanda.

METHODS

A retrospective review was conducted at the University Teaching Hospital of Kigali (CHUK) over a 1-year period (June 2014 to June 2015). CHUK is one of the 4 tertiary referral hospitals in Rwanda, located in the capital city of Kigali. District hospitals from 29 districts refer patients to CHUK.

The target population was pediatric patients aged 15-years and below admitted for a chief complaint of burn injury. The criteria for inpatient treatment are burns over 10% of total body surface area (TBSA); suspected inhalation burns; suspected intentional injury; burns on the face, hand, foot, perineum, or major joints; circular burns on extremities; full-thickness burns above 5% of TBSA; and burns associated with potentially serious sequelae (electrical and chemical burns). Pediatric burn patients treated as outpatients were excluded from the study.

Data collected included demographic characteristics (age, sex), description of the burn (cause, TBSA affected, and burn depth), length of hospital stay, and outcomes. Data was analyzed using SPSS version 20 (IBM, Armonk, NY).

Taking the outcome "death" as a dependent variable, all the independent variables were analyzed and statistical significance set as a p-value less than 0.05 at 95% confidence interval. Pearson chi-square test was used to analyze factors associated with mortality. Study approval was obtained from CHUK's Research and Ethical Committee.

RESULTS

A total of 72 pediatric patients were admitted with burns over a one-year period (Table 1). Most were males (63.9%), with a male to female sex ratio of 1.7:1. The mean age was 2.9 years. Scalds were the most common type of burn (67/72, 93.1%), followed by fire (5.6%), and electrical (1.4%) (Figure 1). Most burns were partial thickness (66/72, 91.7%); full thickness occurred in 6 (8.3%) patients (Table 1). The majority of the patients were children aged 2 to 3 years (41.7%) (Table 2).

Table 1. Characteristics of pediatric patients admitted with burns at CHUK over a one-year period.

Demographics, n=72 (%)	
Sex	Male 46/72 (63.9%) Female 26/72 (36.1%)
Age	Mean 2.88 years
Type of burns	Scald 67/72 (93.1%) Fire 4/72 (5.6%) Electrical 1/72 (1.4%)
Burn depth	Full thickness 6/72 (8.3%) Partial thickness 66 /72 (91.7%)

Table 2. Distribution of types of burn by age group among pediatric burn patients admitted at CHUK over a one year period.

Age	Types of burn			Total (n=72)
	Scald	Fire	Electricity	
0 – 1	24 (33.3%)	2 (2.8%)	-	26 (36.1%)
2 – 3	30 (41.7%)	-	-	30 (41.7%)
4 – 5	8 (11.1%)	1 (1.4%)	-	9 (12.5%)
6 – 15	5 (6.9%)	1 (1.4%)	1 (1.4%)	7 (9.7%)
Total	67 (93 %)	4 (5.6%)	1 (1.4%)	72 (100%)

Clinical outcomes

The length of hospital stay ranged from 1 to 105 days with a mean and median of 20.9 and 15 days respectively. The mean length of hospital stay for the non-survivors was 14.8 days with their hospital stay ranging from 2 to 39 days. Twelve out of 72 patients died (16.7%), with

equal distribution in sex; 10 (83.3%) patients died of scald and 2 died of fire burn injuries (Table 3). Mortality was significantly associated with TBSA ≥ 25% (p = 0.001) and full thickness burn (p=0.022).

Table 3. Clinical outcomes of pediatric burn patients admitted at CHUK according to age, sex, burn type, burn depth, and total body surface area burned.

		Clinical outcome		Total	p-value
		Death	Discharge		
Age	0 – 1	5 (6.9%)	21 (29.2%)	26 (36.1%)	0.898
	2 – 3	4 (5.6%)	26 (36.1%)	30 (41.7%)	
	4 – 5	2 (2.8%)	7 (9.7%)	9 (12.5%)	
	6 – 15	1 (1.4%)	6 (8.3%)	7 (9.7%)	
Sex	Female	6 (8.3%)	20 (27.8%)	26 (36.1%)	0.273
	Male	6 (8.3%)	40 (55.6%)	46 (63.9%)	
Types	Scald	10 (13.9%)	57 (79.2%)	67 (93.1%)	0.170
	Electricity	0 (0.0%)	1 (1.4%)	1 (1.4%)	
	Fire	2 (2.8%)	2 (2.8%)	4 (5.6%)	
Depth	Partial	9 (12.5%)	57 (79.2%)	66 (91.7%)	0.022*
	Full	3 (4.2%)	3 (4.2%)	6 (8.3%)	
TBSA	≥ 25%	9 (12.5%)	9 (12.5%)	18 (25%)	0.001*
	<25%	3 (4.2%)	51 (70.8%)	54 (75%)	

(* refers to a significant value (p<0.05); TBSA – Total Body Surface Area)

DISCUSSION

Burns continue to be amongst the major cause of mortality and morbidity in pediatric population. Compared to other studies done in developing countries which report mortality rates of 11.9 %, 11.7% and 9.5%, we reported a higher mortality rate of 16.7% [8-10]. This finding may be partly attributed to CHUK being a tertiary hospital where sicker patients tend to be referred. At lower level facilities, the health professionals might have triaged patients with less severe burns in their hospitals and referred those with more severe burns.

The biggest affected age group was toddlers (aged 2 to 3) which is in keeping with other studies done in developed and developing countries [5, 10]. The high incidence in this age group can be explained by their natural tendency of exploration, unawareness of danger and effete coordination of their movements when learning how to walk steps [3]. Preventive measures should be targeted towards this age group, including community education on supervision and burn prevention. A further explanation for this finding is that in Rwanda; usually young children are carried on the mother’s back till the age of 2-years and therefore more protected from injury.

Scalds were the predominant cause of burns. This finding is congruent globally, the only difference being in the mechanism of the injury [3, 11]. In developing countries where houses are overcrowded and limited in access to utilities, scalding occurs most frequently when a pot containing boiling liquid is overturned. These kinds of burns might be prevented by merely placing the container

at a height unreachable to the child or by testing water before taking a bath [12]. The low number of electrical burns and lack of contact burns is likely due to the fact that many Rwandan households do not yet have access to electricity [13]. Three of the four cases of burns due to fire were females aged 4 to 15 years of age. This age group of girls typically assists their mothers in household chores, potentially placing them at risk for the hazards brought by cooking on firewood.

The mean length of hospital stay was 20.9 days, which may be explained by the severity of burns since our study was conducted in a tertiary referral hospital. A similar length of hospital stay was reported in a study done in Tanzania where the reason was due to a delay in consultation by some patients [9]. With delayed presentation to the tertiary center, the wounds had become severe and/or superinfected necessitating extended length-of-stay. In our study we did not collect data on delay in consultation. The association of mortality with TBSA burned > 25% and full thickness burns is similarly reported in a study from Ghana though their TBSA burned was greater than 36%, and they described scald and inhalational injury as additional factors [14]. The same association is seen in other studies in Tanzania and rural India as well [9, 10].

A limitation of this study is that it may not reflect the actual pattern of burns in the general population as this study focused on admitted children at a tertiary level facility. Moreover this study did not collect information from children with burns not meeting criteria for inpatient admission.

CONCLUSION

Children under age 3 were the most affected age group and should be the priority target for any public health measures aimed at preventing burn injury in pediatric population in Rwanda. Burns are preventable and efforts should be guided primarily toward preventing its occurrence. Community education about household safety, and promotion of early consultation could make a positive impact on the prevalence and outcomes of pediatric burn injuries.

REFERENCES

1. "GBD_report_2004update_full.pdf." [Internet]. Available from: http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_full.pdf [cited 2015 Jul 22].
2. P. Hodgins, P. Hodgins, T. Potokar, and P. Price, "Comparing rich and poor: burn prevention in Wales, Pakistan, India, Botswana and Zambia," *Burns*, vol. 37, no. 8, pp. 1354–1359, Dec. 2011.
3. S. Dissanaika and M. Rahimi, "Epidemiology of burn injuries: highlighting cultural and socio-demographic aspects," *Int Rev Psychiatry*, vol. 21, no. 6, pp. 505–511, Dec. 2009.
4. R. Jamshidi and T. T. Sato, "Initial Assessment and Management of Thermal Burn Injuries in Children," *Pediatrics in Review*, vol. 34, no. 9, pp. 395–404, Sep. 2013.

5. R. Anlatıcı, Ö. R. Özerdem, C. Dalay, E. Kesiktaş, S. Acartürk, and G. Seydaoğlu, "A retrospective analysis of 1083 Turkish patients with serious," *Burns*, vol. 28, no. 3, pp. 239–243, May 2002.
6. J. C. LeBlanc et al., "Home safety measures and the risk of unintentional injury among young children: a multicentre case-control study," *CMAJ*, vol. 175, no. 8, pp. 883–887, Oct. 2006.
7. M. Nakitto and R. Lett, "Paediatric burn injuries: a hospital based study in Uganda," *InjPrev*, vol. 16, no. Suppl 1, pp. A46–A47, Sep. 2010.
8. P. R. Oduor, "Pediatric Burns at The Rift Valley Provincial General Hospital, Nakuru, Kenya," *Annals of African Surgery*, vol. 6, no. 1, 2010.
9. P. L. Chalya et al., "Pattern of childhood burn injuries and their management outcome at Bugando Medical Centre in Northwestern Tanzania," *BMC Res Notes*, vol. 4, p. 485, Nov. 2011.
10. S. B. Kurane and S. Ugane, "A retrospective study of pediatrics burns at general hospital in rural India," *International Journal of Medical Science and Public Health*, vol. 3, no. 10, pp. 1235–1237, 2014.
11. A. Parbhoo, Q. A. Louw, and K. Grimmer-Somers, "Burn prevention programs for children in developing countries require urgent attention: a targeted literature review," *Burns*, vol. 36, no. 2, pp. 164–175, Mar. 2010.
12. C. Mercier and M. H. Blond, "Epidemiological survey of childhood burn injuries in France," *Burns*, vol. 22, no. 1, pp. 29–34, Feb. 1996.
13. "Rwanda-policy-report-note-1 | Lighting Africa." [Online]. Available: <https://www.lightingafrica.org/resources/policy-reports/rwanda-policy-report-note-1/>. [Accessed: 07-Apr-2016].
14. P. Agbenorku, M. Agbenorku, and P. K. Fiifi-Yankson, "Pediatric burns mortality risk factors in a developing country's tertiary burns intensive care unit," *Int J Burns Trauma*, vol. 3, no. 3, pp. 151–158, Jul. 2013.