Original Article
African Journal of Paediatric Surgery
Vol. 4 (2); Jul - Dec 2007

Paediatric Burns: Mortality in a Burns Unit

[1]Olaitan P.B. [2]Dairo M.D. [3]Uduezue A.O. And [4]Ogbonnaya I.S.
[1]Burns and Plastic Surgery Unit, Department of Surgery, [2]Department of Community Medicine, Ladoke Akintola University of Technology Teaching Hospital, Osogbo, Osun state, Nigeria.
[3]Department of Surgery, Ebonyi State University Teaching Hospital, Abakaliki, Ebonyi State and
[4]Plastic and Reconstructive Surgery Department, National Orthopaedic Hospital, Enugu, Nigeria.

Abstracts

Objectives: The purpose of this study was to evaluate the aetiology of burns, the mortality rate and factors contributing to mortality in children with burns.

Patients and Methods: A retrospective review of mortality among children in a burns unit over a 5 year period was done. Outcome of measures included patients' age and sex, agents of burn, number of days on admission before death/discharge and causes of death.

Results: The most common cause of burn injuries in this group of patients was scald (70.90%). Fourteen (11.0%) out of 127 children died; flame was responsible for most 13(92.8%) deaths. Acute renal failure (ARF) was the cause of deaths in 6(42.8%) patients, sepsis in 5(35.7%), multiple organ failure in 1 (7.1%), and upper gastrointestinal bleeding in 1(7.1%) patient.

Conclusion: Burn injury, especially from flames, is associated with a high mortality rate in children. Safe practices with flammable liquids (petrol in particular) should be emphasized in paediatric burn prevention programmes.

Key Words: Paediatric, burn, mortality, prevention.

Introduction

Burns constitute a major morbidity and mortality among children, particularly in developing countries. While survival has improved tremendously in burned children regardless of age, burn size, presence of inhalation injury, delay in resuscitation, or laboratory values on initial presentation in some advanced centres[1-3], the same can not be said of developing countries with limited resources and facilities, a dearth of qualified personnel to manage burn patients and poverty[4-13].

This study determined the agents of burns among children and identified the risk factors for mortality in this age group, in a developing country.

Patients and Methods

A retrospective review of mortality among children in a burns unit over a 5 year period was carried out at the National Orthopaedics Hospital, (NOA), Enugu, Nigeria, between January 1996 and December 2000. The hospital is a referral centre for burn injuries, serving about eight of the 36 states in Nigeria, with a population of over 30 million people. Data including patients' age and sex, agents of burn, number of days on admission before death/discharge and causes of death were extracted from the patients' case notes and admission register, and analyzed using the SPSS version 11 software. Categorical data were compared with the chi square statistic while the quantitative data were compared with the student's t test. The survival times were compared using the log-rank test.

Results

Two hundred and eighty five patients with acute burn injuries were admitted during the study period. One hundred and fifty eight (55.4%) of the patients were older than 14 years, while 127 (44.6 %) were aged 0 to 14 years with a mean age of 5.3 years. Seventy four (58.3 %) of the 127 children were males and 53 (41.7 %) were females (M: F=1.4:1).

Correspondence: Dr. P.B. Olaitan, Dept of Surgery,Ladoke Akintola University of Technology Teaching Hospital, Osogbo, Osun State, Nigeria.Tel:234 8033609292.

Copyright © 2007 African Journal of Paediatric Surgery

Table 1: Aetiology of Burns in Children & Adults

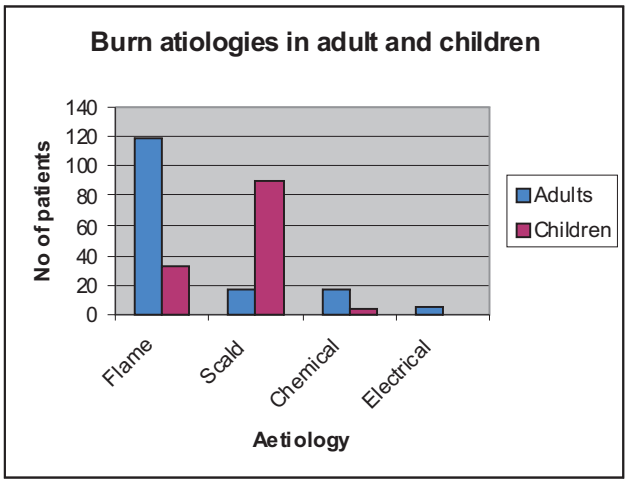


Table 2: Mortality of the Paediatric Patients by age groups

Age Group (in years)	No of Patients (%)	Mortality (%)
0-3.9	53 (41.7)	1 (1.9)
4-9.9	46 (36.2)	6 (13.0)
>10	28 (22.0)	7 (25.0)
Total	127 (100.0)	14 (11.0)

Table 3: Comparative Analysis of Mortality and Survival in Paediatric Burns

Characteristics	Outcome Died (N=14)	Survived (N=113)	P Value
Age (mean) in months	8.9±4	4.9±3.8	0.003
Sex: Male	7 (50)	67 (59.3)	0.442
Female	7 (50)	46 (40.7)	
Agent: Flame	13 (92.9)	20 (17.7)	0.0001
Scald	1 (7.1)	89 (78.8)	
Chemical	0(0)	4 (3.5)	
Total Burn Surface Area (mean)	64.9±19.7	10.9 ± 9.6	0.0001
No of days admission (mean)	21±39	10.6 ± 5.6	0.06
Terminal Complications			
Sepsis	5	0	N.S
ARF	7	0	
MOF	1	0	
Upper G.I. Heamorrhage	1	0	

Table 4: Percentage burn mortality by burn surface areas

Total Burn Surface	Total Number	Mortality (%)
0-10	66	0(0)
11-20	30	0(0)
21-30	12	0(0)
31-40	6	2(33.3)
41-50	3	2(66.7)
51-60	2	2(100.0)
61-70	2	2(100.0)
>70	6	6(100.0)
Total	127	14(11.0)

The commonest cause of burn injuries in the paediatric age group was scald in 90 (70.9%), followed by flame in 33 (26.0%) and chemical injuries in 4 (3.1%) children. Among adult patients, flame (75.3%) was commoner than scald (11.4%) injuries. No electrical injuries were observed among the children (Table 1).

The overall mortality rate was 20.0% (57). Mortality rate in the paediatric age group was 11.0% (14). The mortality rate was 1.9 % in the 0-3.9 year-age group, and 13.0% and 25.0% among those aged 4-10 year (Table 2). Flame was the most common source of injuries among the deceased patients in 13 (92.8%) patients; one (7.1%) of those who had scald also died. All the patients who had 60% or more burn surface areas died. The mean burn surface area of the patients who died was 64.9% ± 19.7, compared with 10.9% ± 9.6 in those who survived ($p < 0.01$). The mean number of days on admission was 21± 39 days among those who died compared to 10.6 ± 15.6 among those who survived ($p = 0.06$).

Causes of death among the children included acute renal failure (ARF) in 6 (42.8%), sepsis in 5 (35.7%), multiple organ failure in 1 (7.1%), and upper gastrointestinal bleeding in 1 (7.1%) patient (Table 3). There was a rise in mortality

Copyright © 2007 African Journal of Paediatric Surgery

the percentage of the burn surface increased (Table 4). The mean survival time was longer in those with scald than in those with flame (log rank statistic=16.87, p<0.01).

Discussion

Thermal injuries cause high morbidity and mortality rates among children[14], especially in developing countries[15]. Most of the injuries in this study occurred at home like in most[16], and scald was the most common cause of the burns injury as in other reports[17,19].

Burn aetiology differs in the different age groups; the older children tend to have more flame burns while the younger children sustain more scalds. More children died from flame burns than from scald in this study (13 vs 1), especially among the older age group with a mortality rate of 92.8%. Mortality in this study was higher among the children who were older than 10 years than in those who were less than 4 years (22.2% vs 1.9%). Acute renal failure, sepsis, multiple organ failure and upper gastrointestinal bleeding were the major causes of death in our current study in this study as in others[20,21].

Age and gender are not important predictors of mortality. Lower age, larger burn size, presence of inhalation injury, delayed intravenous access, low haematocrit on admission, lower base deficit on admission, higher serum osmolarity, sepsis, inotropic support requirement, platelet count less than 20,000, and ventilator dependency during the hospital course are significant predictors of increased mortality[22]. Large burn size, infection as well as inhalation injury are other predictors of mortality in some reports[23-25].

Early presentation and active resuscitation, prevention and control of infective complications and adequate nutritional support are keys to successful management of children with burns. Inadequate

Brûlures pédiatriques: la mortalité dans une unité des grands brûlés

Résumé

Objectif: Le but de cette étude était d'évaluer l'étiologie des brûlures, le taux de la mortalité et les facteurs qui contribuent à la mortalité des enfants brûlés. ***Malades et méthodes:*** Nous avons fait une révision rétrospective de la mortalité parmi les enfants dans une unité des brûlés pendant une période de 5 ans. Les données enregistrées comprennent l'âge et le sexe des malades, les agents de la brûlure, la durée de l'hospitalisation avant la mort /la sortie et les causes de la mort. ***Résultats:*** La cause la plus répandue de la brûlure chez ce groupe de malades était l'échaudage (70,90%). Quatorze (11,0%) des 127 enfants sont morts; la flamme était responsable de 13 (92,8%) morts. L'insuffisance rénale sévère (IRS) était la cause de la mort de 6 (42,8%) malades, la septicité a eu raison de 5 (35,7%), un malade (7,1%) a succombé à l'insuffisance organique multiple et un autre (7,1%) au saignement gastro-intestinal supérieur. ***Conclusion:*** La brûlure, surtout due aux flammes, est liée à un taux élevé de mortalité chez les enfants. Dans les programmes de prévention de brûlures pédiatriques, on devrait mettre l'accent sur la prudence dans la manipulation de liquides inflammables (l'essence en particulier). ***Mots-clés:*** Pédiatrie, brûlure, mortalité, prévention.

References

1 Morrow SE, Smith DL, Cairns BA, et al. Etiology and outcome of pediatric burns. J Pediatr Surg. 1996; 31:329-333

2 Tung KY, Chen ML, Wang HJ, et al A seven-year epidemiology study of 12,381 admitted burn patients in Taiwan--using the Internet registration system of the Childhood Burn Foundation. Burns. 2005; 31 Suppl 1:S12-7.

3. Sharma PN, Bang RL, Al-Fadhli AN, et al. Paediatric burns in Kuwait: incidence, causes and mortality. Burns. 2006; 32:104-111.

4. Panjeshahin MR, Lari AR, Talei A, et al. Epidemiology and mortality of burns in the South West of Iran. Burns. 2001; 27: 219-226.

5. Alaghehbandan R, MacKay Rossignol A, Rastegar Lari A. Pediatric burn injuries in Tehran, Iran. Burns. 2001; 27: 115-118.

6. Kumar P, Sharma M, Chadha A.Epidemiological determinants of burns in paediatric and adolescent patients from a centre in western India. Burns. 1994; 20: 236-240.

7. Laloe V. Epidemiology and mortality of burns in a general hospital of Eastern Sri Lanka. Burns. 2002; 28: 778-781.

8. Lari AR, Bang RL, Ebrahim MK, Dashti H. An analysis of childhood burns in Kuwait. Burns. 1992; 18: 224-227.

9. Olaitan P.B.; Olaitan J.O. Burns and Scalds:Epidemiology

Copyright © 2007 African Journal of Paediatric Surgery

and Prevention In a Developing country. Nigerian Journal of Medicine. 2005; 14: 9-16
10. Iregbulem L.M., Nnabuko REE. Epidemiology of Childhood thermal injuries in Enugu, Nigeria. Burns, 1993; 19: 223-226.
11. Olaitan P.B; Jiburum B.C. Analysis of Burn mortality in a Burn Unit. Annals of Burns and Fire Disasters. 2006; XIX: 59-62.
12. Kalayi GD. Burn injuries in Zaria: a one year prospective study.East Afr Med J. 1994; 71:317-322.
13. Wolf SE, Rose JK, Desai MH et al: Mortality determinants in massive pediatric burns. An analysis of 103 children with > or = 80% TBSA burns (> or = 70% full-thickness). Ann Surg. 1997; 225: 554-565.
14. Passaretti D, Billmire DA. Management of Paediatric burns. J Craniofac Surg. 2003; 14: 713-718.
15. Al-Shehri M. The pattern of Paediatric burn injuries in South western Saudi Arabia. West Afr J Med. 2004; 23; 294-299.
16. Lari, A R ; Panjeshahin, M; Talei, A et al. Epidemiology of Childhood Burn Injuries in Fars Province, Iran. Journal of Burn Care & Rehabilitation.2002; 23: 39-45.
17. Mukerji G, Chamania S, Patidar GP, et al. Epidemiology of paediatric burns in Indore, India. Burns. 2001; 27:33-38.
18. Kumar P, Chirayil PT, Cittoria R. Ten years epidemiological study of paediatric burns in Manipal, India. Burns, 2000; 26:261-264.
19. Barrow RE Spies M, Barrow LN, et al. Influence of demographics and inhalation injury on burn mortality in children. Burns. 2004; 30:72-77.
20. Wong MK, Ngim R., Burns mortality and hospitalization time--a prospective statistical study of 352 patients in an Asian National Burn Centre. Burns.1995; 21:39-46.
21. Muguti GI, Mazabane BN. An analysis of the factors contributing to mortality rates in burns patients treated at Mpilo Central hospital, Zimbabwe. J R Coll Surg Edinburg.1997; 42:259-261.
22. Wolf SE, Rose JK, Desai MH, et al. Mortality determinants in massive pediatric burns. An analysis of 103 children with > or = 80% TBSA burns (> or = 70% full-thickness). Ann Surg. 1997; 225: 554-565.
23. Ramakrishnan KM, Sankar J, Venkatraman J Profile of pediatric burns Indian experience in a tertiary care burn

Copyright © 2007 African Journal of Paediatric Surgery