

Epidemiology of burns in a major referral hospital in Brunei Darussalam

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INTRODUCTION Burn injuries are a public health concern across the world, particularly in Southeast Asia, where epidemiological data is lacking. This retrospective study was conducted to assess the epidemiology of patients with burns treated at a major referral hospital in Brunei Darussalam, with particular reference to demographics and aetiology.

METHODS All patients were referred to and treated at the Burns Unit, where data was recorded by the on-duty nurse on a pre-designed form at the first attendance. A total of 211 patients (111 male, 100 female), comprising 10 inpatients and 201 outpatients, were treated during the study period.

RESULTS The average age of the patients was 19.6 ± 20.9 (median 10, range < 1–90) years. 67 (32%) patients were under two years of age. Scalding due to hot liquids was the most common cause (78.2%), followed by flame and contact burns. The majority of burns were sustained indoors either at home or at work (87.2%). The total body surface area (TBSA%) for the whole sample was $3.7\% \pm 7.9\%$ (median 2%; range 1%–90%). Patients with flame burns ($n = 19$) were older and had larger TBSA% ($p < 0.05$). Inpatients had significantly higher TBSA% compared to outpatients ($28.2\% \pm 26\%$ versus $2.5\% \pm 2.1\%$; $p < 0.005$).

CONCLUSION Scald burns sustained indoors are the most common across all age groups. Although the TBSA is small, a large number of children are affected. There is a need for burns prevention education programme in Brunei Darussalam.

Keywords: burns, epidemiology, paediatric, prevention
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INTRODUCTION

Burn injuries represent a significant public health concern across the world. In children and young adults, fire-related deaths are one of the leading causes of death.⁽¹⁾ More than 50% of fire-related deaths in the world occur in Southeast Asia, and females in this region have the highest fire-related burn mortality rates. A large number of patients are left with lifelong disabilities and disfigurements.⁽²⁾ Burn injuries are associated with a longer hospital stay compared to other injuries and illnesses, and have significant economic consequences.^(3,4) A large percentage of burns occur accidentally and are preventable. Effective prevention plans should be based on the study of epidemiological characteristics, demographic features, risk factors and identification of safety pitfalls.⁽⁵⁾

Only few epidemiological studies on burn injuries are available from Southeast Asia,^(6–8) and no such data are available from Brunei Darussalam. The purpose of this study was to assess the epidemiology of burns patients treated at Raja Isteri Pengiran Anak Saleha Hospital (RIPASH), Brunei Darussalam, with particular reference to demographics and aetiology.

METHODS

This was a retrospective analysis of cases of burns that were treated at the Burns Unit of RIPASH between September 2007 and August 2008. All burn patients attending RIPASH were referred

to and treated at the Burns Unit managed by the Department of Orthopaedics till August 2009. The cases of burns are now managed by the Department of Maxillofacial, Plastic and Reconstructive Surgery. Data was recorded by the on-duty nurse on pre-designed forms on the first attendance at the unit. Data obtained from these forms was entered into an excel worksheet and analysed using the Statistical Package for the Social Sciences version 10.0 for Windows (SPSS Inc, Chicago, IL, USA). The results are presented for the whole sample, patients over 15 years, 15 years and below, and below two years of age. The variables of age and total body surface area (TBSA%) affected were expressed as mean \pm standard deviation (SD). A p -value < 0.05 was considered statistically significant.

RESULTS

A total of 211 patients were treated at the Burns Unit during the study period. A total of 32 patients were admitted, but details were available for analysis for only ten patients. The remaining patients were treated as outpatients. There were 111 male and 100 female patients in the sample. The distribution of gender according to different groups is given in Table I. The average age of patients was 19.6 ± 20.9 (median 10, range < 1–90) years. 32% of subjects were under two years of age. The age distribution of the sample is shown in Fig. 1. None of the burns in children aged ≤ 15 years were recorded as due to child abuse. Patients with flame burns

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Table I. Gender distribution of cases of burns (n = 211).

Age groups (yrs)	No. (%)	
	Male	Female
Age > 15 (n = 95)	50 (52.6)	45 (47.4)
Age ≤ 15 (n = 116)*	61 (52.6)	55 (47.4)
Age < 2 (n = 67)	31 (46.3)	36 (53.7)
Total	111 (52.6)	100 (47.4)

*Includes children aged < 2 years.

Table II. Causes of burns in the various groups.

Cause	No. (%)			
	Total (n = 211)	> 15 yrs (n = 95)	≤ 15 yrs (n = 116)*	< 2 yrs (n = 67)
Scalding	165 (78.2)	67 (70.5)	98 (84.5)	60 (89.6)
Flame	19 (9.0)	17 (17.9)	2 (1.7)	-
Contact	15 (7.1)	5 (5.3)	10 (8.6)	6 (9.0)
Explosion	5 (2.4)	3 (3.2)	2 (1.7)	-
Not recorded	7 (3.3)	3 (3.2)	4 (3.4)	1 (1.5)

*Includes children aged < 2 years.

Table III. Total body surface area (TBSA%) affected.

	Mean ± SD			
	Total (n = 211)	> 15 yrs (n = 95)	≤ 15 yrs (n = 116)*	< 2 yrs (n = 67)
TBSA%	3.7 ± 7.9	5 ± 11.4	2.6 ± 2.4	2.5 ± 2.6

*Includes children aged < 2 years. SD: standard deviation

(n = 19) were older than the rest of the sample, with an average age of 37.7 ± 21.5 years compared to 17.8 ± 20.1 years for burns due to other causes ($p < 0.05$).

Scalding due to hot liquids was the most common cause of burns across the sample (78.2%). The aetiology of burns after further analysis of the sample is given in Table II. Among patients with flame burns (n = 19), ten resulted from attempted burning of dry waste, two from playing with fire crackers, one was suicidal flame burns while the cause was not recorded in six patients. The majority of burns were sustained indoors, either at home or at work (87.2%). Except for one case, all flame burns were sustained outdoors.

The TBSA% in the subjects according to various age groups is shown in Table III. The TBSA% for the whole sample was $3.7 \pm 7.9\%$ (median 2%; range 1%–90%). The TBSA% for patients with flame burns was $14.4\% \pm 23.2\%$ compared to $2.7\% \pm 2.3\%$ from other causes ($p < 0.05$). The TBSA% was significantly higher in inpatients compared to those treated as outpatients ($28.2\% \pm 26\%$ vs. $2.5\% \pm 2.1\%$; $p < 0.005$). The distribution of cases according to the month of occurrence is given in Fig. 2. The maximum number of cases were recorded in the month of November followed by May.

DISCUSSION

The present study revealed that scalding sustained indoors is the most common cause of burns in Brunei Darussalam. A large number of cases are from the paediatric age group, although the TBSA affected is small.

A number of studies from across the world have reported on

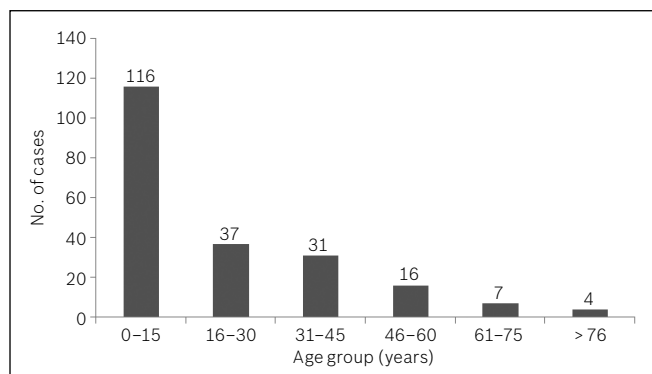


Fig. 1. Graph shows the number of burns cases according to age groups.

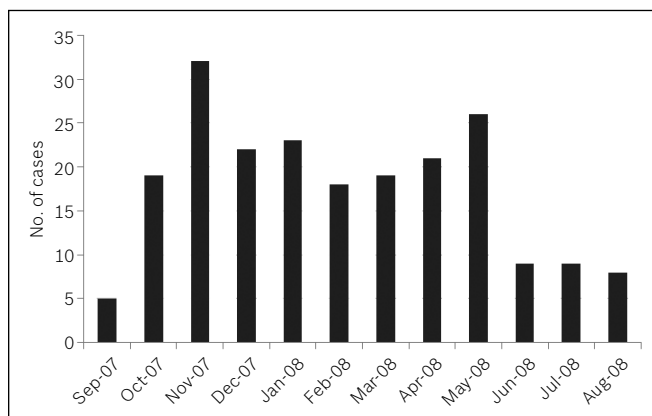


Fig. 2. Graph shows the number of cases treated according to month.

the epidemiology of burns.⁽⁶⁻¹⁷⁾ In all these studies, males were found to be more affected than females, with most of the burns sustained indoors due to scalding and affecting a large proportion of subjects under five years of age. Some studies have reported a bimodal distribution of burns occurring in subjects below ten years of age and in those 30–40 years of age.^(9,11,18) Our finding of a larger number of female children being affected is in agreement with those of Justin-Temu et al⁽¹⁹⁾ and Palmeiri et al.⁽²⁰⁾ A change in male to female ratio, from 5:1 in the whole sample to 2:1 in children aged ≤ 15 years, was reported by Feng et al.⁽¹⁸⁾ In certain reports, mainly from Iran and India, a female preponderance for burns cases has also been reported, particularly for higher age groups.^(16,17,21)

There is a wide variation in the TBSA% based on whether the study included all patients, inpatients or outpatients. Generally, studies that include inpatients have reported higher TBSA% compared to outpatients.^(15,16,22) In the present study, a large number of patients (n = 201) were managed as outpatients, and hence, the TBSA% was much lower, whereas it was higher in those requiring inpatient care. Consistent with the present study, patients sustaining flame burns were older and had a higher TBSA%.^(10,12) Studies done in paediatric populations have confirmed that scalding (70%–83%), especially occurring indoors (> 90%) is the most common cause, and most of these patients are under the age of five years.^(10,19,23-25) Kai-Yang et al⁽²²⁾ presented a review of retrospective studies involving paediatric burns requiring hospitalisation in China, and found a range of male:female ratios (1.25:1 to 4.42:1). In most instances, the burns reported were

sustained indoors, with a ratio of indoor vs. outdoor burns of 1.62 to 17.00. Most of the studies reviewed reported burns due to hot liquids, flame, electricity or chemical, with scalding being the most common cause.⁽²²⁾

In the present study, the majority of the findings regarding gender and age distribution, aetiology and circumstances as well as the TBSA involved are similar to those reported in the literature. Importantly, our study noted that 32% of the burn patients were under two years of age, with a preponderance for the female gender. Among this age group, the causes of burns were scalding and contact burns sustained indoors, which are entirely preventable. The reasons given for the increased incidence of burn injuries in young children are their curiosity and desire to learn by touch and taste, without being aware of the dangers involved.⁽²⁵⁾ Young children also lack the skills for self-defence and to remove themselves from a dangerous situation, and most of them spend a large amount of time indoors with their caretaker.^(22,25)

Review of studies from the East Mediterranean has shown winter months as the most common time for occurrence of burns. This was attributed to cold conditions, poor electrical supply and use of other means for heating.⁽¹⁶⁾ A review of studies from China did not observe any particular pattern, as the studies were from areas with differing climatic conditions.⁽²²⁾ In the present study, no particular trend in hospital admissions in terms of month of admission was noted. The climate in Brunei Darussalam is equatorial, with high temperatures, heavy rainfall and no cold season. The occurrence of burns could also be influenced by living conditions and local cultural practices.⁽²²⁾

The risk factors associated with fire-related burn injuries include substance abuse, violence, medical co-morbidities and other social, economic and cultural factors.⁽²⁾ Other risk factors reported include family economic status, children from single-parent family or large families, presence of pre-existing impairment in children, lapses in supervision of children, storage of flammable substances at home, low maternal education and stress.^(25,26)

There are conflicting reports in the literature about the usefulness of a burns prevention programme. In a pilot study, the teaching of scald burn prevention was seen to significantly change the number of preventive measures taken by the parents.⁽²⁷⁾ The Cochrane Database review of community-based interventions, however, concluded that there was insufficient evidence on their effectiveness in preventing burns and scalds in children.⁽²⁸⁾ In contrast, Cagle et al demonstrated that a focused burns-prevention programme could identify high-risk groups, decrease the scald risks per home and also reduce the rate of scald burns.⁽²⁹⁾ In Brunei Darussalam, the Brunei Fire and Rescue Department conducts Fire Exercises as a part of their public awareness programme at work places, and also makes this information available through the Occupational Health Division of the Ministry of Health, Brunei Darussalam.⁽³⁰⁾ However, there is currently no community-based programme for prevention of burns in the country. The results of the present study could help in designing such a programme.

The current study has some limitations. The retrospective design meant that analysis could be done only for the data collected. It would have been appropriate and interesting to obtain data on the affected body part, the depth of burns and other variables such as size of the family, socioeconomic condition and educational level. It was not possible to examine the occupational profile of the patients and clinical outcome in individual cases. Also, the sample did not include patients from the other smaller district hospitals of Brunei Darussalam.

In conclusion, the study has identified young children as the subjects most at risk of sustaining burns. In addition, we also identified that scalding was the most common cause of burns with most commonly sustained indoors. These cases are essentially preventable. As such, there is a need for a community-based burns prevention education programme in Brunei Darussalam.

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