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An epidemiological analysis of paediatric burns in urban and rural areas in south central China

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ABSTRACT

Objective: This study aims to analyse the epidemiology of paediatric burns in south central China, illustrate the differences between rural and urban areas, and discern prevention measures to reduce paediatric burns.

Methods: Data were obtained from all paediatric patients admitted to Department of Burns unit of Xiangya Hospital during 2009–2012. A retrospective review was performed, including cause of burn, pre-hospital treatment, place of burn occurrence, anatomical areas involved, extent of burn, date of injury, number of operations, complications, length of hospital stay, hospitalisation cost and cure rate.

Results: A total of 278 hospitalised paediatric patients were admitted in this study. The majority (56.47%) were 1–3 years old. Rural patients accounted for 67.99% in total; the ratio of boys to girls was 2.05. Scalding with hot fluids was the most common cause of burns in children (62.59%), followed by flame (17.63), fireworks (9.71%), electricity (5.76%) and other factors such as contact and chemical (4.32%). The living room was the location with the highest frequency of burns in children (53.24%). Burns were more likely to happen in winter and the upper extremities were the most involved anatomic site (53.24%). Total burn surface area (TBSA) ranging from 0% to 9% accounted for 55.4% in total. Rural patients underwent more operations and had longer and costlier hospital stays than urban patients.

Conclusion: Compared with treatment in urban areas, rural burn patients received less first-aid treatment, underwent more surgery, had more complications and longer and more costly hospital stays. This finding strongly suggests that it is necessary to make more efforts to prevent burns, especially in rural areas.

Burns are a common injury in the paediatric population, and with both high treatment costs and morbidity rates, this injury type merits deep concern and intensive research. Compared with developed countries, the incidence of paediatric burns is much higher in developing countries, such as countries in Africa and some areas of Asia. It is reported that over half of all paediatric burn patients are Asian and Americas had the lowest incidence of hospitalised paediatric burn patients [1]. With the largest population in the world, China also has the largest paediatric population.

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China has made great economic progress in recent years, while the discrepancies between the rural and urban areas have become even greater than in the past. Despite a decline in the total incidence of severe burns recently, the ratio of paediatric burn to all burn patients remains relatively high, especially in rural areas of China. We have also noticed a considerable increase in the numbers of rural paediatric burn patients in recent years. It has been reported that paediatric patients from remote or poor areas were more likely to have poorer clinical and functional results [2]. In order to reduce the incidence of paediatric burns and improve the treatment, it is very important to understand the epidemiology characteristics and promote the prevalence of burn prevention knowledge; many factors affect the incidence rate of burns and the results of burn treatment, such as living conditions, special customs, seasons, and education levels. In this study, we analyse the differences in the clinical outcomes of urban and rural paediatric burn patients in south central China to determine their epidemiological characteristics and the reasons for discrepancies and to discuss any potential prevention measures.

1. Materials and methods

1.1. Subjects

All the data in this retrospective study were collected from the burn care unit of Xiangya Hospital, one of the largest burn care centres in south central China. The inpatient medical records of 676 burn patients who were hospitalised between 1 January 2010 and 31 December 2012 were reviewed. Among them, a total of 278 paediatric patients aged from 0 to 16 years were ultimately enrolled in the study. Patients were divided into urban groups or rural groups according to their registered residence: those who lived in a city or a town were defined as urban and those who came from the countryside were defined as rural; additionally, the migrant workers from rural regions who lived in the suburbs with their children were included in the rural population. The data we analysed included the age, gender, type of residential area (rural or urban), cause of burn, pre-hospital treatment, where the burn occurred, the anatomical area involved, the extent of the burn, the date of the injury, the number of operations, complications, the length of the hospital stay (LOS), hospitalisation cost and the cure rate. Degree of burns and total burn surface area (TBSA) were estimated by two attending physicians in our centre, according to the Rules of Nines and Rules of Palms.

1.2. Statistical analysis

A standard descriptive analysis was performed, and Pearson's χ^2 test was used to examine differences in the gender constituent ratios, pre-hospital treatments, cure rates, operation rates and complication rates between the rural and urban groups. Differences in the LOSs and the costs of hospitalisation between the two groups were evaluated with the Mann–Whitney *U*-test. All the statistical analyses were conducted with Statistical Package for the Social Sciences (SPSS) version 17.0 for Windows (SPSS Inc., Chicago, IL, USA). $P < 0.05$ was considered to be statistically significant.

2. Results

2.1. Demographic data

During the 3-year period, 676 burn patients were hospitalised, including 278 children below the age of 16 who were enrolled in this study (age range 13 days to 16 years old, median 2.2 years, interquartile range = 2.8). Three of the children died during hospitalisation; the mortality rate for children was 1.08% in this study. The frequency of paediatric burns in the patients referred to the hospital was 41.12%. The resident paediatric patient population consisted of 67.27% males and 32.73% females. The ratio of rural to urban dwellers was 2.12. There was no significant difference between the urban and rural areas in the sex ratio (Pearson's $\chi^2 = 0.015$, $P = 0.901$) (Fig. 1a). The patients were divided into eight groups according to their ages. The age distributions in the rural and urban groups are shown in Fig. 1b; the majority of the paediatric burn patients were aged 1–3 years in both the rural and the urban areas.

2.2. First-aid treatment

Different first-aid treatments after burns also have been investigated between the two groups. Among the patients from rural areas, 52 of 189 (27.51%) had been treated with cold water immediately after the burn, and in the patients from urban areas, 36 of 89 (40.45%) had been treated with cold water immediately after the burn; the difference between the two groups is statistically significant (Pearson's $\chi^2 = 4.68$, $P = 0.031$) (Table 1). Many of the cooling treatments were sustained for <20 min. Some patients were treated with other substances, such as wine, animal oil, soy sauce, toothpaste or Chinese medicine, or received no treatment at all. Among all the patients, 92 of 189 (48.68%) rural ones received no treatment at all and 45 of 189 (23.81%) received incorrect first-aid treatment; while among urban patients, 35 of 89 (39.33%) patients received no treatment at all and 18 of 89 (20.22%) patients received incorrect treatment after burns. There was no statistically significant difference between rural and urban patients who received no or incorrect treatment (Pearson's $\chi^2 = 0.02$, $P = 0.884$).

2.3. The locations of burns

According to the study, most of the burns occurred indoors. More than half of the injuries occurred in the living room (53.24%), followed by the outdoors (16.19%) and then the dining room (10.79%). The specific data for the urban and rural differences are shown in Table 2.

2.4. Types of burns

Scalding was the most common type of burns, with boiling water, hot soup or hot milk causing the overwhelming majority of injuries. A total of 174 patients (62.59%) were