Introduction

A vast majority of burns in children occur by accident. Lack of proper supervision and not following prevention guidelines are common causes of burns in children. It has been reported that burns are the third most common unintentional lethal injury in the paediatric population. Risk of burn injuries and their treatment is a major problem for health care systems. Most children who survive severe burns suffer from long-term debilitating complications such as limb movement limitations due to contractures, disfiguring scars, psychological problems and social isolation, which results in a significant loss of productive life years. Unfortunately, these injuries often remain life-long. Due to lower standards of living conditions, burns are more common in developing countries.

Fars province has a warm-temperate climate. It is one of the largest provinces in Iran with a population of about 4 million people, and rural households make up a large percentage of the population. Ghotbeddin Shirazi Hospital is the only burn centre in the province. Therefore, all burn cases that require treatment are referred to this hospital. In this study we evaluated the burn spectrum in children under 15 years old in Fars.

SUMMARY. The aim of this study was to determine the demographic characteristics of burnt children in need of hospitalization, causes of burns and associated complications in Fars province, Iran. This is a retrospective cross-sectional study. Files of all children under 15 years of age who were hospitalized in the only burn referral centre of Fars province were evaluated. Data regarding age, gender, location (urban, rural), burn surface area (BSA), cause of burn, length of hospital stay and complications were extracted from patients’ files. Data were analyzed using SPSS, version 22 and the Chi-square test. A p-value of less than 0.05 was considered as statistically significant. A total of 122 patients (54.9% males) were studied. Children from rural areas were hospitalized 1.4 times more often than urban children. Overall, 31.2% of admissions occurred in winter. Burning with hot liquids (scalding) was the most common cause of burns (56.6%, n = 69). Mean BSA was 12.29 ± 21.18% and mean length of hospital stay was 7.59 ± 12.78 days. Burn complications were seen in 19 cases (15.6%). One child died due to inhalational thermal injury. This study showed that burns mostly occur in boys, in the winter and in rural areas of Fars province. Furthermore, scald burns are the most common type of burn injury. Since a significant number of children suffer from permanent complications following burn injuries, special planning is needed to prevent this type of injury.

Keywords: burns, injuries, paediatrics, Iran, Fars, child

RÉSUMÉ. Le but de cet étude rétrospective était de déterminer les caractéristiques démographiques, les causes et les complications des brûlures pédiatriques ayant nécessité une hospitalisation à Fars (Iran). Les dossiers des enfants (<15 ans) hospitalisés dans le CTB de Fars ont été évalués. Les données concernant l’âge, le sexe, l’habitat (rural ou urbain), la surface brûlée (SB), la cause, la durée de séjour et les complications ont été recueillies et analysées par X² au moyen de SPSS 22, avec un seuil de significativité à p≤ 0.05. Cent vingt deux dossiers (54,9% de garçons) ont été étudiés. Les rapports enfants ruraux/urbains était de 1,4/1. Il y avait un pic d’admissions en hiver (31,4%). Un ébouillantement était le mécanisme le plus fréquent (69 fois soit 56,6%). La surface brûlée moyenne était de 12,29 (+/- 21,18%), et la durée moyenne d’hospitalisation était de 7,59 +/- 12,78. Un enfant est mort, dans un contexte d’inhalation de fumées. Dix neuf séquelles (15,6%) ont été observées. Les brûlures (qui sont plus souvent des ébouillancements) touchent donc plutôt des garçons, ruraux, pendant l’hiver. Dans la mesure où un nombre significatif d’enfants brûlés gardent des séquelles, des actions de prévention spécifiques sont nécessaires.

Mots-clés : brûlures, enfant, Fars, Iran

Corresponding author: Assoc. Prof. Dr. Hossein Sanaei-Zadeh, Emergency Room, Division of Medical Toxicology, Hazrat Ali-Asghar (p) Hospital, Meshkinfam Street 7143918796, Shiraz University of Medical Sciences, Shiraz, Iran. Tel.: +98 713 228 8604; fax: +98 713 228 8907; email: sanaeizadeh@sums.ac.ir

Manuscript: submitted 06/09/2016, accepted 14/10/2016.

Marashi S.M.,1 Sanaei-Zadeh H.,1,2 Taghizadeh Behbahani A.,2 Ayaz M.,3 Akrami M.4

1 Emergency Room, Division of Medical Toxicology, Hazrat Ali-Asghar (p) Hospital, Shiraz University of Medical Sciences, Shiraz, Iran
2 Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran
3 Shiraz Burn Research Centre, Department of Surgery, Shiraz University of Medical Sciences, Shiraz, Iran
4 Department of Surgery, Shiraz University of Medical Sciences, Shiraz, Iran

PAEDIATRIC BURN INJURIES REQUIRING HOSPITALIZATION IN FARS, SOUTHERN IRAN
BRÛLURES DE L’ENFANT NÉCESSITANT UNE HOSPITALISATION À FARS (IRAN MÉRIDIONAL)
province who were admitted to this hospital from 25th March 2014 to 25th March 2015.

Patients and methods

This is a descriptive retrospective study. The records of all burn cases among children under 15 years old who were admitted to Ghotbeddin Shirazi Hospital over a one-year period from March 25th 2014 to March 25th 2015 were reviewed. Cases who were admitted electively for skin grafting, and also cases who were hospitalized in other health care facilities for at least a week before referral to this hospital, were excluded from the study. Data regarding patient age, sex, location (urban, rural), cause of burn, burn surface area (BSA), length of hospital stay, treatment, and outcomes were collected. For evaluation of BSA, the Lund and Browder chart was used. Data were analyzed using SPSS-22 software (SPSS Statistics, IBM Corporation, Armonk, NY) and the Chi-square test. P-value of less than 0.05 was considered as statistically significant.

Results

This study evaluated a total of 122 children under 15 years of age. Table I shows the age and sex distribution of patients. Fifty-two cases (42.6%) were from rural and 70 cases (57.4%) were from urban areas. Considering the proportion of people under the age of 15 who live in urban and rural areas of Fars province, the incidence rate was 1.46 per 10,000 people/year for rural children and 1.05 per 10,000 people/year for urban children who were hospitalized with burn injuries.

Burn frequency based on seasons was as follows: 40 cases (31.2%) in the winter, 33 cases (27%) during fall, 28 cases (22.9%) during summer, and 23 cases (18.9%) during spring. The finding is in accordance with the results reported in the Iranian population.1,12-16 However in a study from India17 prevalence of burn incidents was 3 times higher in girls.

Most patients with BSA of less than 10% required no hospitalization and were treated in an outpatient facility. Mean BSA was 21.18 ± 12.29% (between 3% and 60%) and in 62.3% of cases BSA was estimated to be between 10 to 30%. Table II demonstrates the relationship between BSA and causes of burn.

Table I - Age and sex distribution of children under 15 years old admitted to Ghotbeddin Shirazi Hospital

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Male</th>
<th>Female</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>18 (48.6%)</td>
<td>19 (51.4%)</td>
<td>37 (100%)</td>
</tr>
<tr>
<td>1-2</td>
<td>12 (52.2%)</td>
<td>11 (47.8%)</td>
<td>23 (100%)</td>
</tr>
<tr>
<td>3-4</td>
<td>18 (62.1%)</td>
<td>11 (37.9%)</td>
<td>29 (100%)</td>
</tr>
<tr>
<td>5-7</td>
<td>8 (50.0%)</td>
<td>8 (50.0%)</td>
<td>16 (100%)</td>
</tr>
<tr>
<td>&gt;8</td>
<td>11 (64.7%)</td>
<td>6 (35.3%)</td>
<td>17 (100%)</td>
</tr>
<tr>
<td>Total (%)</td>
<td>67 (54.9%)</td>
<td>55 (45.1%)</td>
<td>122 (100%)</td>
</tr>
</tbody>
</table>

Table II - Frequency distribution of burn surface area based on cause of burn

<table>
<thead>
<tr>
<th>Burn surface area (%)</th>
<th>&lt;10</th>
<th>10-19</th>
<th>20-29</th>
<th>30-39</th>
<th>&gt;40</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot liquids</td>
<td>6 (8.7%)</td>
<td>28 (40.6%)</td>
<td>15 (21.7%)</td>
<td>10 (14.5%)</td>
<td>10 (14.5%)</td>
<td>69 (100%)</td>
</tr>
<tr>
<td>Hot materials</td>
<td>5 (83.3%)</td>
<td>0 (0%)</td>
<td>1 (16.7%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Explosion</td>
<td>3 (11.5%)</td>
<td>12 (46.2%)</td>
<td>8 (30.8%)</td>
<td>2 (7.7%)</td>
<td>1 (3.8%)</td>
<td>26 (100%)</td>
</tr>
<tr>
<td>Flame</td>
<td>0 (0%)</td>
<td>4 (40.0%)</td>
<td>2 (20.0%)</td>
<td>2 (20.0%)</td>
<td>2 (20.0%)</td>
<td>10 (100%)</td>
</tr>
<tr>
<td>Car accident</td>
<td>2 (66.7%)</td>
<td>1 (33.3%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Kerosene compounds</td>
<td>1 (12.5%)</td>
<td>2 (25.0%)</td>
<td>3 (37.5%)</td>
<td>1 (12.5%)</td>
<td>1 (12.5%)</td>
<td>8 (100%)</td>
</tr>
<tr>
<td>Total</td>
<td>17 (13.9%)</td>
<td>47 (38.5%)</td>
<td>29 (23.8%)</td>
<td>15 (12.3%)</td>
<td>14 (11.5%)</td>
<td>122 (100%)</td>
</tr>
</tbody>
</table>

Mean length of hospital stay was 7.59 ± 12.78 days (ranging from 1 to 38 days). There were no statistically significant differences between length of hospital stay and cause of burn

In all cases, burns occurred by accident. About 67.5% of burns in children under 4 years of age were caused by hot liquids. However, among those who were older than 8, explosions were the most common cause of burn injuries. In 4 of the cases, explosions were due to playing with fire crackers, and in 22 cases the explosion was caused by a gas leak in the home. Three cases had burns caused by car accidents (2.5%). None of the children in our study had electrical or chemical burns.

Treatment measures included painless dressing in 79 patients (64.8%) and skin grafting in 37 (30.3%). Apart from skin grafts, further surgery was needed in 6 cases (4.9%). Burning due to hot materials, flame and kerosene products required more skin grafting (p = 0.007) than other causes of burn.

Burn complications in order of frequency were as follows: disfiguring scars in 14 cases (11.5%), motion limitation in 3 cases (2.5%) and contractures in 2 cases (1.6%). A 4 year-old girl with BSA of more than 40% died due to inhalational thermal injury.

Discussion

Our study showed that most of our patients were younger than 4 years old. The finding is in accordance with the results of other studies in Iran and other countries.1,10-12 This reflects the fact that this age group is at higher risk of burn injuries.

In our study, burn prevalence was 1.22 times higher in boys, which is consistent with the majority of other studies reported in the Iranian population.1,12-16 However in a study from India17 prevalence of burn incidents was 3 times higher in girls.

Burn rates in children living in rural areas of Fars province was about 1.4 times greater than that of children living in urban areas. This is similar to data reported from other regions in Iran and other countries.1,5 About one third of burn cases in our study occurred during the winter. The reason for this is the increased use of heating devices during winter. However, another study reported that burns are more common in older children during the summer, the reason being that schools close in summer and children have more free time to play with fire.13 Also, a study from Morocco reported that the coincidence of summer with the holy month of Ramadan resulted in high rates of burns with a traditional soup that is especially cooked in this month.14

Most cases of burns in children are preventable.1,18 Our study also showed that all cases occurred subsequent to accidents.

In the present study explosions were a common cause of burn incidents (e.g. home gas explosions and playing with fire crackers on the last Wednesday of the year). In Fars province,
urban gas is widely used for heating and cooking in homes. Ignoring safety recommendations regarding the use of urban gas (such as checking the connections, making sure that the gas valve is closed, etc.) can easily create an explosion and cause a burn accident. Moreover, broadcasting advertisements to make people aware of dangers and changing cultural practices associated with the last Wednesday of the year ceremony could reduce these accidents. The last Wednesday of the year ceremony is one of the oldest Iranian rituals. In this ritual, people start a fire and jump over it. However, in recent years the use of firecrackers, flares and other fireworks at the ceremony has become common.

None of the children in our study had electrical or chemical burns. On the other hand, burns caused by car accidents were significantly higher in our study than in others.1,12-16 This confirms the current problem of car accidents in Fars province and the need for proper planning to prevent this type of injury.

In the present study, the most common cause of burns in children under the age of 4 was scald. It seems that this is related to the conventional method of cooking in Iran (boiling water for preparing rice, tea, etc.). Educating parents, especially mothers, to not have their children with them when cooking or to not leave them alone with boiling water can prevent this type of burn. Scalding, as the most common cause of burns in children, has been reported in different studies to be from 47% to 83.5%.11,12,14,15 Average BSA was 21% in our patients, which is much higher than that reported in other studies.1,19,20 The most important reason for this seems to be the fact that most of the burn cases with less than 10% BSA were treated as outpatients.

Burning with hot materials, flame and kerosene products needed higher rates of skin grafts than burns by other causes. This has also been shown in other studies.11,21 The complications that we recorded in our study were similar to those reported by other studies.1,5,11,22 In the present study only one death occurred, which is a lower death rate than that of other studies.5,8,11,12,15,16,19,20 Poulos et al.8 believed that in recent decades, the development of health care facilities, advancements in specialized burn units, effective prevention measures and social changes have had an important impact on the reduction of hospitalization rates as well as mortality due to severe burns.

**Limitations**

Due to the retrospective nature of the study, tracking long-term complications of burns was not feasible. Also, the percentage of children with burns in Fars province is undoubtedly higher than the number of children studied here, for the following reasons:

1. Children who were treated in the outpatients department were not included in this study.
2. Cases with severe burns who died at the scene of the accident and were transferred to the mortuary were not included in the study.
3. Some non-severe burn patients who were living in remote areas might not have been referred to Ghotbeddin Shirazi Hospital due to long distances and the parents’ preference to receive treatment in nearby health care centres.

**Conclusion**

Most of the burn incidents in this study were preventable. The study showed that burn rates in boys during winter and in rural areas of Fars province was high. Furthermore, scald burns were the most common type of injury. Considering that a significant percentage of children suffer permanent complications following burns, prevention programs should be considered as the most important point in healthcare-related plans. The study showed that the number of burn cases among children in rural areas of Fars province was higher than that of urban areas. Given the role of mothers in the prevention of such incidents, educational programs should be considered for this group. Moreover, it is necessary to abide by safety guidelines to prevent gas explosions in homes, and to diffuse appropriate advertisements on potential dangers on the last Wednesday of the year and on measures to prevent car accidents.

---

**BIBLIOGRAPHY**


Acknowledgements. This study was supported by Shiraz University of Medical Sciences. This article has been extracted from the thesis written by the third author of this article (proposal #10132-01-01-94 approved on March 5, 2016).
The authors would like to thank the Clinical Research Development Centre of Namazi Hospital and the Burn Research Centre of Shiraz University of Medical Science, Shiraz, Iran, for their cooperation in this study.

Conflict of Interest. The authors of this article declare that they have no competing interests.