

Epidemiological Study of 1938 Burn Patients from 2014-2016 in Qazvin, Iran

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Abstract

Background: Many people suffer from burn injuries annually. Epidemiologic studies are necessary to reveal the prevalence and related factors of burns to assist in designing an appropriate plan to reduce its mortality and morbidity.

Objectives: This study aimed to analyze the epidemiology and etiological factors of 1938 burn patients admitted to a burn unit in Qazvin, Iran.

Methods: This was a retrospective study of medical records of patients admitted to the burn unit of Shahid Rajaei Hospital from March 21, 2014 to March 20, 2016. The collected data included age, gender, percentage of burns, etiology, date of admission, date of discharge, and total burn surface area (TBSA). Descriptive statistics were used to describe the basic features of the studied variables.

Results: The mean age of the 1938 burn patients was 29.08±20.52 years. The results showed that more males (n=1391, 71.8%) than females (n=547, 28.2%) were involved in burn injuries. Fire flame (n=1019, 52.6%) and scald (n=529, 27.3%) were major etiological factors of burns. Adult males (n=458, 23.6%), and preschool boys (n= 407, 21.0%) were at the highest risk for burn through the study period. The mean total body surface area (TBSA) was 13.34 (SD ±12.40) ranging from 1% to 9%, and burns of less than 20% TBSA represent the large majority of burns (n=1653, 85.3%).

Conclusion: This study indicates that the majority of burn injuries were of the fire flame and scald types. Preventive programs targeting the population under higher risk of burns are needed to reduce the burden of burns.

Keywords: Burns, Epidemiology, Injuries, Fire.

Introduction

Burns can be life-threatening emergencies (1,2). Burns comprise the fourth most common cause of injury after traffic accidents, falls, and interpersonal conflicts, accounting for between 5% and 12% of the world's accidents (3). Annually, burns affect approximately 11 million persons and are more prevalent than AIDS and tuberculosis (4). The incidence of burn injuries in Iran has a high with a formidable public health problem in terms of mortality, morbidity, and permanent disabilities. The first Iranian national report on burns was presented at the Isfahan Burn Congress in 2002 and stated that one million and one hundred thousand people in Iran are hospitalized annually due to burns (5).

Burns are caused by many external origins, including thermal, chemical, electrical, and radiation sources. Most burn-related injuries are caused by thermal energy, including

scalding and fires, and fewer are caused by chemical exposure, electricity, and ionizing radiation. Burns are a major cause of injury worldwide (6). Burn-related injuries are one of the most important and most expensive health issues that occur at all ages (7). Every year, thousands of people die due to burn injuries; most deaths occur in people pre-school aged or over 65 years of age (6). Burns are the 11th leading cause of death for children between 1–9 years old and the 5th most common cause of non-fatal childhood injuries. Burn injury is one of the most important causes of morbidity, disability, and mortality in developing countries (8). In Iran, burns are the sixth leading cause of mortality, as about 50,000 people suffer burns each year, of whom 2600 develop acute complications and need critical care (9).

Burn-related injuries and complications affect all aspects of human life. Survivors of burns may suffer from social problems as well as physical and psychological disorders.

Burns are a major cause of disability particularly in low- and middle-income countries (10). They also lead to a high financial and social burden on the individuals and families involved (11,12). Socio-emotional problems are also prevalent among burn patients (13). The most common psychological problems faced by burn injury patients are pain, anxiety, depression, post-traumatic stress disorder, concern about bodily disfigurement, social isolation, and financial burden (11, 14-17). Burn injuries are not specific to any given population or location (18). They affect every age group, ethnicity, and occupation (4). Many burn complications are preventable (19). Resolving burn-related complications among burn injury patients is often associated with an improvement of quality of life and wellbeing (20).

Burn prevention strategies still remain the best way to reduce the incidence of burn-related morbidity and mortality (6). There are 12 specialized burn hospitals in Iran and more than 45 burn care facilities that are located inside general hospitals (21). Access to information on the prevalence and causes of burns from some of these centers was not available. Exact epidemiological information is essential for the provision and equipment of burn centers as well as for proper planning to prevent burn-related injuries and mortality.

Objectives

This study aimed to assess the epidemiological characteristics of burn patients in the three-year period from 2014-2016 in Qazvin, Iran.

Materials and Methods

In this retrospective study, data was retrieved from the medical records of patients admitted to the burn unit of

Shahid Rajaei Hospital from March 21, 2014 to March 20, 2016 and consisted of age, gender, percentage of burns, etiology, date of admission, and date of discharge. Outpatients and patient records with missing data were excluded from the study. Patients' burn wound charts were also obtained to confirm the percentage of total body surface area (%TBSA) involved in burns.

Data was analyzed using Statistical Package for Social Science (SPSS) software, version 20 (SPSS Inc., Chicago, IL, USA). Descriptive statistics in the form of tables and cross-tabulations were created to show the demographics and burn characteristics of the study subjects (n=1938). A probability value (*p*-value) of less than 0.05 was considered statistically significant at a 95% confidence interval. Ethical approval for this study was obtained from the Ethics Committee of Qazvin University of Medical Sciences (IR.QUMS.REC.1397.071).

Results

A total of 1938 burn patients were admitted to Shahid Rajaei Hospital from March 21, 2014 to March 20, 2016. The mean age of the patients was 29.08 ± 20.52 years and ranged from 1 to 95 years. Among them, 1391 (71.78%) were male and 547 (28.22%) were female. The male-female ratio of all burns injuries was 2.54:1.0. The mean length of hospital stay was 5.81 ± 5.73 days and ranged from 1 to 61 days. The majority of burns occurred in adults in the 21-30 age group (n=458, 23.6%) followed by pre-school children (n=407, 21.0%). The results also showed that in all age groups (except those older than 60 years), burn injuries were more common in males than in females. Furthermore, the number of burn patients in each studied year was almost the same over the 3-year period (Table-1 and Figure-1).

Table-1. Prevalence of burn among age groups from 2014 to 2016 (n=1938)

	First year*	Second year	Third year	Total
Age Group	N (%)	N (%)	N (%)	N (%)
0-5	148 (7.7)	136 (7.0)	123 (6.3)	407 (21.0)
6-10	30 (1.6)	24 (1.2)	25 (1.3)	79 (4.1)
11-20	39 (2.0)	49 (2.5)	37 (1.9)	125 (6.4)
21-30	140 (7.2)	154 (8.0)	164 (8.5)	458 (23.6)
31-40	97 (5.0)	133 (6.9)	140 (7.2)	370 (19.1)
41-60	120 (6.2)	122 (6.3)	114 (5.9)	356 (18.4)
>60	37 (1.9)	55 (2.8)	51 (2.6)	143 (7.4)
Total	611 (31.5)	673 (34.7)	654 (33.7)	1938 (100)

* : From 21 March 2014 to 20 March 2015

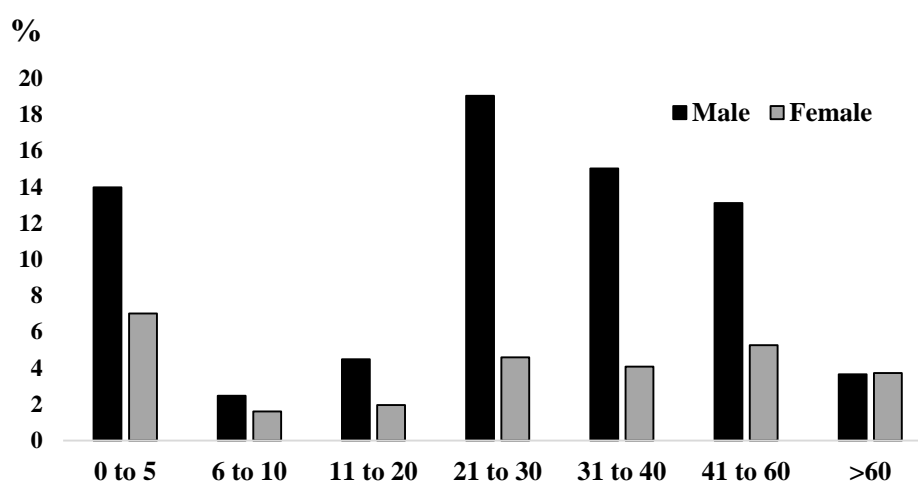


Figure-1. Compare burns injuries based on age and gender from 2014 to 2016

The main causes of burns were fire flame (n=1019, 52.6%), followed by scalding (n=529, 27.3%). Children below 6 years of age and school children in the 6-10-year age group were the most affected, and burn injuries were caused mainly by scalding; however, fire flame was most common in the 21-30-year age group. Fire-related burn injuries comprised the most common cause of burn among female patients (Table-2).

As depicted in Table-3, the vast majority of patients (58.5%) sustained burns on 10% or less of their bodies; 519 patients (26.8%) sustained burns on 11-20% and only 25 patients (1.3%) sustained burns on more than 60% of their bodies.

The distribution rates of burn severity by etiology are shown in Figure 2. The burn percentages (TBSA%) were highest for flame burns (mean TBSA=15.81), followed by scalding (mean TBSA=11.20), and they were lowest for hot surface burns (mean TBSA=6.63).

Table-2. Aetiology of burns based on age groups and gender (n=1938)

Aetiology	0-5	11-20	21-30	31-40	41-60	>60	Male	Female	Total
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Flame	53 (19.6)	54 (62.1)	233 (63.1)	177 (60.8)	89 (58.2)	48 (67.6)	751 (54)	268 (49)	1019 (52.6)
Scalds	176 (64.9)	18 (20.7)	38 (10.3)	34 (11.7)	22 (14.4)	15 (21.1)	333 (23.9)	196 (35.8)	529 (27.3)
Electricity	4 (1.5)	8 (9.2)	18 (4.9)	29 (10)	13 (8.5)	3 (4.2)	77 (5.5)	9 (1.6)	86 (4.4)
Hot food	26 (9.6)	1 (1.1)	10 (2.7)	7 (2.4)	1 (0.7)	1 (1.4)	52 (3.7)	33 (6)	85 (4.4)
Chemicals	4 (1.5)	2 (2.3)	16 (4.3)	13 (4.5)	6 (3.9)	2 (2.8)	46 (3.3)	10 (1.8)	56 (2.9)
Acid	2 (0.7)	1 (1.1)	16 (4.3)	9 (3.1)	4 (2.6)	2 (2.8)	34 (2.4)	6 (1.1)	40 (2.1)
Melt	0 (0)	0 (0)	17 (4.6)	11 (3.8)	11 (7.2)	0 (0)	43 (3.1)	3 (0.5)	46 (2.4)
Hot surface	5 (1.8)	2 (2.3)	11 (3)	8 (2.7)	2 (1.3)	0 (0)	33 (2.4)	8 (1.5)	41 (2.1)
Other	1 (0.4)	1 (1.1)	10 (2.7)	3 (1)	5 (3.3)	0 (0)	22 (1.6)	14 (2.6)	36 (1.9)
Total	271 (100)	87 (100)	369 (100)	291 (100)	153 (100)	71 (100)	1391 (100)	547 (100)	1938 (100)

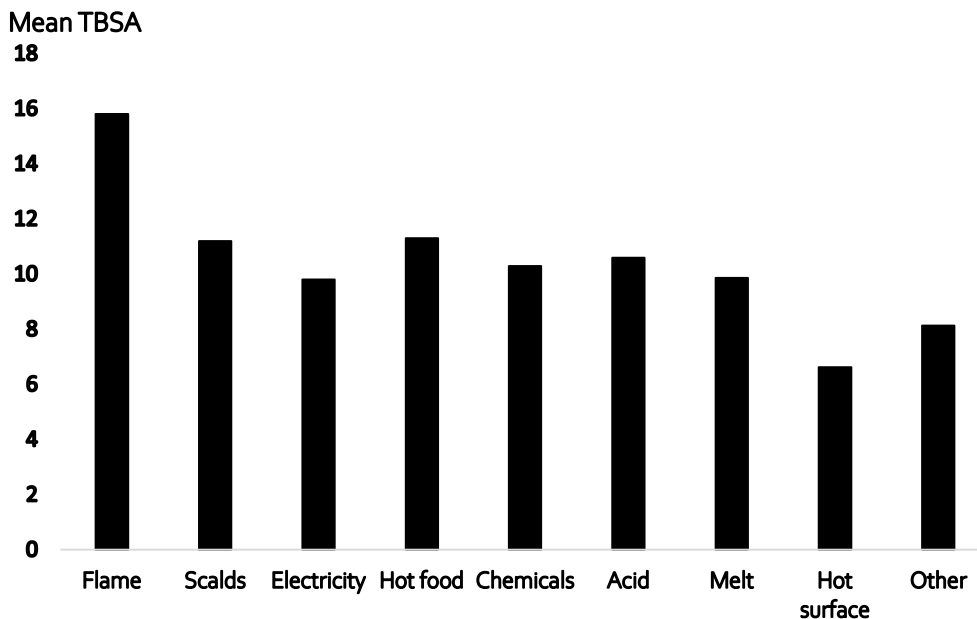


Figure-2. Burn percentage distribution based on causes of burns

Table-3. Distribution of patients by TBSA group

TBSA%	n	%
0-10	1134	58.5
11-20	519	26.8
21-40	216	11.1
41-60	44	2.3
61-80	15	0.8
81-100	10	0.5
Total	1938	100.0

TBSA: total body surface area

Discussion

This study is unique and the first of its kind to investigate the epidemiological characteristics of burn injuries in patients admitted to Shahid Rajaei Hospital, Qazvin, Iran, for the 3 years from March 21, 2014 to March 20, 2016. The information it provides is important. The current study found that fire flame was the primary cause of burns in both sexes that are consistent with national studies (22-24). This is largely due to the fact that kerosene and gas are the fuels most commonly used to produce heat for buildings and workplaces in Iran. However, the results of some studies in Pakistan (25), Gaza (26), and Oman (27) have shown that scalding is the most common cause of burn injuries. These discrepancies may be related to the study samples and the environment under study.

Based on the current results, males (71.78%) were more

affected by burns than females (28.22%) with a ratio of 2.54:1.0. Similarly, Siddiqui et al. (2015) reported the male dominance of 68.7% over females 31.3% with a ratio of 2.20:1.0 among 403 burn patients admitted to a Pakistan national emergency department (25). In another study, among a total of 135 severe-burn patients hospitalized at Motahari Burn and Reconstruction Center, 93 patients were males (68.9%), and the male-female ratio was 2.22:1.0 (24). Elsous et al. (2016) also found that males (60.80%) were more affected than females (39.20%) with a ratio of 1.55:1 (26). These results may be related to the responsibility men have to earn money, leading them to work in different places with risk of burn injuries.

Consistent with the results of some previous studies (25,26,28,29), the current study found that adult males (21-30 years old) and preschool boys (under 6 years old) were at the highest risk for burn throughout the study period. This result might be associated with the fact that male children are usually more active than females and so have a higher possibility of exposure to burn risk factors. Furthermore, children under 6 years of age are often unaware of danger due to lack of experience, and they are curious about their environments. In Iran, young children are often cared for by their grandparents who may suffer from age-related physical decline or disability and may not be able to control their grandchildren well. Therefore, prevention strategies should focus primarily on this age group in the future. Similar to this

study, higher incidence rates of burn injuries among young adults have been reported in different countries by studies from Pakistan (25), India (30) and Iran (31). Injuries in young adults may be related to participation in the workforce for financial necessities.

A notable result of this study is that fire injuries comprised the most common reason for burn injuries among females. Commonly, burn injuries in developing countries are mostly caused by fire-related accidents in home environments (32,33). This is explained by the fact that culturally, the majority of Iranian women tend to work with fires and stoves, especially for cooking. So, efforts should be made to provide educational programs to improve the literacy rate among women, the safe use of kitchen appliances for preparing food, and ensure safety when using a gas stove for cooking and heating.

The current study confirmed the findings of previous studies (6,26) that burns of less than 20% TBSA represent the large majority of burns. In this study, 0 ~ 10% TBSA burns comprised 58.5%, and 11 ~ 20% TBSA burns comprised 26.8% of burn cases. Similarly, Elsous et al. reported that the vast majority of patients (64%) sustained burns of 10% TBSA or less and 29.6% (56 patient) sustained burns between 11-30% TBSA (26). In a study by Li et al., 0 ~ 10% TBSA burns comprised 64.1% and 11 ~ 20% TBSA burns comprised 19.3% of burn cases (6). Furthermore, the mean of TBSA in our study was 13.34%, which was less than similar previous studies in Zahedan (31.2%), Kordestan (48.2%), and Urmia (28.9%) (24,34,33). The explanation for this result could be the lack of burn ICUs in Shahid Rajaei Hospital (place of study), which meant that patients with a high percentage of TBSA were transferred to better equipped burn centers and thus not entered in the present study.

The results of this study showed that the highest and lowest percentages of burns were related to fire injuries (15.81%) and injuries from hot surfaces (6.63%), respectively. This result may be associated with the explanation that in burns by hot materials, injuries occur only in the area of the skin that is in direct contact with the hot material; however, fire is usually inclusive and injures different areas of the body. After fire, the second and third highest percentages of burn injuries were caused by scalding and hot food, respectively. In both of these types of burns, burning materials usually flow down, injuring a wide section of the body.

The current results showed that the number of burn

inpatients was almost the same over the 3-year period. This result could be related to a lack of effective prevention programs and increased workplace unsafety. Therefore, effective burn prevention and treatment measures are needed to decrease the trend of burn injuries in the coming years.

The findings of this study should be interpreted with caution due to the following limitations. First, severe burn patients were not included in this study as they were transferred to an intensive care unit of a burn center. Second, participants of the current study were patients of one Iranian burn unit; therefore, the results may not be generalizable to other Iranian burn survivors or those from other countries.

Conclusions

This is the first study to describe the epidemiology of burn injuries and their related factors among patients hospitalized in a burn center in Qazvin, Iran. The findings showed that in the future, children under 6 years of age, males, and burns caused by fire should receive more consideration to prevent burn injuries. This study clearly indicates that preventive measures in the home could considerably reduce the number of major burns, especially in children and women.

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Authors' Contribution

SAM: Design of research, data analysis, interpretation of data, writing and translation of manuscript, and supervise the research team; AA: Design of research, data collection, and preparation of initial drafting; ABR: Design of research, data collection, and preparation of initial drafting. NS: Design of research and data collection; JAI: Design of research, revision of the manuscript.

Conflict of Interests

The authors declared no potential conflict of interests with respect to the research, authorship, and/or publication of this article.

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