An Epidemiologic Survey on Burns in Yazd from 2008 till 2009

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Abstract- Burns are injuries which may require long hospitalization and may result in important impairment and disability. Burn injuries are still common especially in developing countries. Assessment of the epidemiology of burns is very important for introduction of preventive methods. This study was conducted in Yazd to assess and describe the epidemiology of burns including its main causes, and its demographics. In a prospective study during a 1 year period, we assessed the epidemiology of burns in Shahid Sadoughi Burns hospital in Yazd. During this period, 1947 injured patients referred to this hospital. Data were gathered using a questionnaire about demographics and the properties of the burn injury. Burns were more frequent among men than women. A significant number of patients were children. 8.8% of patients needed hospitalization. Thermal burns were much more common than other types. Scalds were the most common cause of burn, and hands were the body region most commonly affected. Mean total body surface area burned (TBSA) was 6.16% (±9.93). This study showed a high incidence of burn injuries at home and in the workplace. The burns were mostly preventive and many of them can be prevented by education.

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Introduction

Injuries are one of the most critical public health problems in various populations. One important cause of injuries is burns. They cause more than 1% of the global burden of disease (1). Burns are devastating traumas, as they require long hospitalization and may result in significant physical as well as psychological sequelae (2).

Burn injuries are yet among the most important public health issues, at least in terms of morbidity and long-term disability, throughout the world, especially in the developing countries (3,4). Burn injuries are a major problem in the low-income and middle-income countries (4). Burns still produce a significant morbidity and mortality in Iran (5). The WHO estimates indicate that overall incidence rate of fire-related burns is 110 per 100,000 per year globally and is 187 per 100,000 per year in the East Mediterranean Region (EMR) in which our country rests (6). To introduce preventive programs, epidemiology of burns including its main causes, and risk factors should be evaluated in each region separately. Burns are classified into thermal, chemical and electrical according to the mechanism of injury. According to the WHO's International Classification, burns are classified as those caused by exposure to smoke, fire and flames, contact with heat and hot substances, exposure to electric current, lightening and exposure to corrosive substances (4).

There are many studies of the epidemiology of burns all over the world (7-20). There are also some studies about Iranian burn patients (4,21-26). There isn't any study on the epidemiology and characteristics of burns in Yazd. This study was conducted in Yazd, a central province in Iran to assess and describe the epidemiology of burns including its main causes, and its demographics and to compare the results with the results of other studies in Iran and other parts of the world.

Materials and Methods

A prospective study has been conducted of the epidemiology of burns in Yazd in a 1 year period from October 1 2008 till October 1 2009. Shahid Sadoughi

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burns hospital is the only burn hospital in Yazd. During this period, 1947 injured patients referred to this hospital.

We gathered our data in this hospital using a questionnaire including demographic data (age, gender, educational status, and place of residence), and data about the properties of the burn injury (degree, area, type, and causing agent). Data was gathered by three physicians who were the first persons visiting the injured patient. Total body surface area burned (TBSA) was estimated by Lund and Browder chart (28). We considered the highest degree of the burn as the reported burn degree. Burn injuries was compared between children and adults and also gender differences was assessed.

An inform consent was filled for each subject. Data was analyzed by SPSS (ver. 17) using T test, chi square test, and Fisher's exact test. A *P* value of <0.05 was considered to be statistically significant.

Results

During one-year period 1947 patients referred to Shahid Sadoughi burn hospital. Mean (±SD) age was 23 (± 17.3) years (range: 1-90 years).

Burns were more frequent among men: 1174 patients (60.3%) were male and 773 patients (39.7%) were female. 725 (37.24%) patients were children (under 18 years old).

Table 1 shows the frequency of burns in different age groups.

172 patients were hospitalized, hence an admission rate of 8.8%. Females were more commonly admitted than males (9.3% versus 5.6%). Mean (±SD) age was 26.88 (±17.75) and 22.69 (±17.28) in admitted patients and outpatients, respectively, and this difference was statistically significant (*P*=0.003).

Among over 18 year-old cases, 56.7% were not graduated from high school. Table 2 shows the frequency of burns according to educational status.

The most frequent burn type was thermal (95.8%), and chemical and electrical burns by frequency of 2.5% and 1.7% were in the second and third order of frequency.

Overall the most common cause of burn injuries were scalds (57.07%). Although in admitted patients, the most common cause of burn was flame (55.8% of cases). Table 3 shows the frequency of agents causing burn in children and adults. The frequency of burn causes was significantly different between children and adults (*P*<0.001).

Table 1. Frequency of burns according to age.

Age (years)	Number	Percent
< 10	562	28.86
10-19	261	13.41
20-39	787	40.42
40-60	270	13.87
>60	67	3.44
Total	1947	100

Table 2. Frequency of burns according to educational status in adults.

Educational status	Number	Percent
Illiterate/Under high-school	673	55.07
High school graduate	361	29.54
Bachelor	152	12.45
Master and doctorate	12	0.98
Missing	24	1.96
Total	1222	100

Table 3. Frequency of agents causing burn differentiating children and adults.

Burn agent	Number (percent)		
	Children	Adults	Total
Flame	56 (7.72)	263 (21.52)	319 (16.38)
Contact	213 (29.38)	232 (18.98)	445 (22.85)
Scalds	451 (62.21)	660 (54.02)	1111 (57.07)
Electricity	4 (0.55)	29 (2.37)	33 (1.69)
Acid	1 (0.14)	33 (2.71)	34 (1.75)
Other chemicals	0 (0)	5 (0.40)	5 (0.26)
Total	725 (100)	1222 (100)	1947 (100)

P<0.001

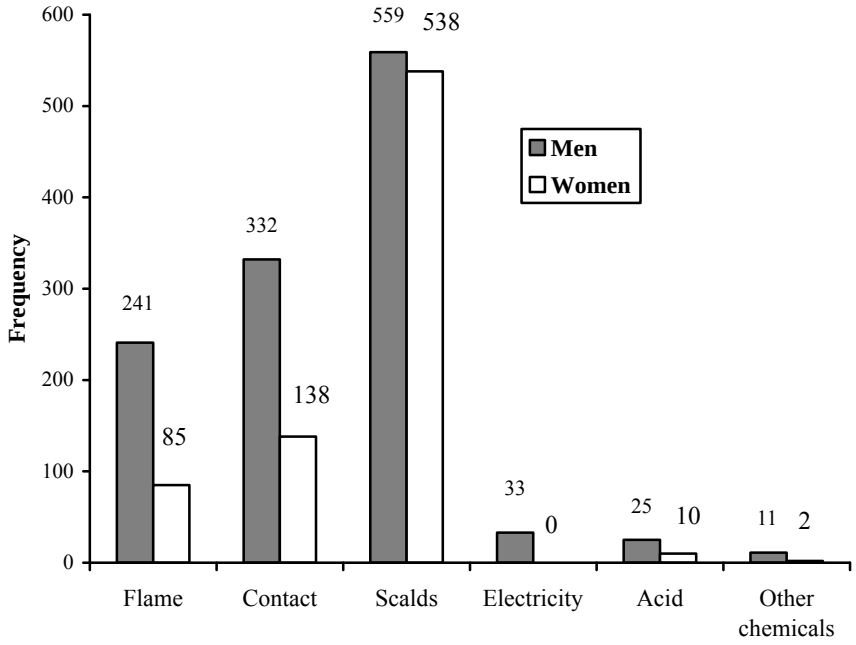

Figure 1. Frequency distribution of burn causes in men and women.

Table 4. Comparison of burn degrees according to the burn mechanism.

Burn mechanism	Burn degree		
	1	2	3
Thermal	251	1194	420
Chemical	2	25	22
Electrical	0	21	12

P <0.001

Figure 1 compares the frequency of burns between men and women. Fisher's exact test showed a significant difference between two genders in the frequency of agents causing burn ($P<0.001$).

Second degree burns were the most common ones (63.7%), and the frequency of third degree and first degree burns was 23.3% and 23% respectively. Mechanism of burn injury had a significant effect on burn degree ($P<0.001$). Table 4 compares the frequency of burn degrees according to the burn mechanism.

Hands were the most common body region burned. Figure 2 shows the frequency of burns in different body parts.

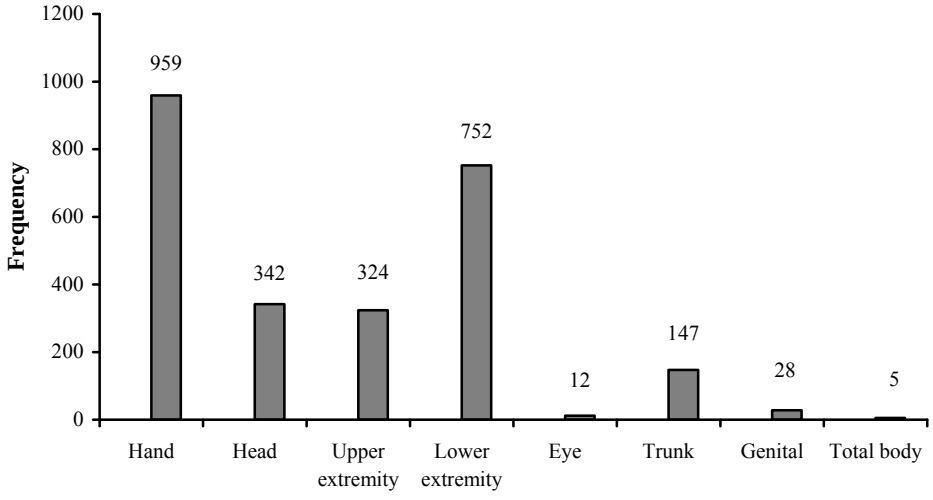

Figure 2. Frequency distribution of burns according to body regions.

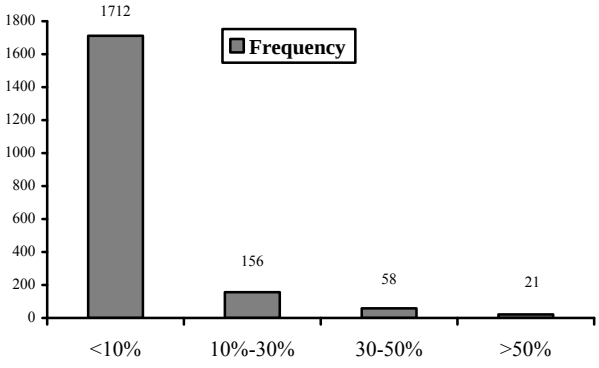

Figure 3. Frequency distribution of patients according to burn extent.

Mean total body surface area burned (TBSA) was 6.16% (±9.93). This measure was 6.81% in adults and 4.95% in children and the difference was statistically significant (P=0.003). Mean TBSA among men and women was 6.84% (±11.19) and 5.71% (±9.01), respectively and this difference was statistically significant (P=0.017). There was an association between TBSA and burn cause (P<0.001). Figure 3 shows the distribution of patients according to TBSA.

Among adults, 24% of burns were work-related (*i.e.* they were happened during work activities), and among admitted patients 20.3% suffered from occupational burns. In 20 cases (1.03%) the burns was due to suicide, among them 15 (75%) cases were females. An important cause of burn in this study was explosion of non-standard pressure cookers which had caused burn injury in 166 cases (8.5%). Two other common causes of burns were motor cycle exhaust pipe (8.6%) and scattering of automobile radiator water (3.7%).

Discussion

Burn injuries are still a common cause of morbidity and mortality all over the world especially in developing countries. In this study we assessed the epidemiology of burn injuries in Yazd, a central province in Iran.

The results of this epidemiological study show male predominance of burn injuries an all age groups, hence showing the effect of gender on burn frequency which is consistent with some other studies (9-12,27); Although in the study of Panjeshahin *et al.* and some other studies burn injuries were more common in females (2,13,15,23,25).

In this study the most common cause of burn was scald which was consistent with some other studies (9,11,21,30), although some studies showed that other causes such as flame are more common (2,5,13,14,23,25), the discrepancy may be due to the population burned, different work-related causes, and cultural differences at home.

The cause of burn was significantly different between men and women, *i.e.* scalds were much more common in females, but flame, chemicals and electricity were more common in males, which is different from the study of Panjeshahin *et al.* in which flame was more common among females (2).

In our study, the 20-39 years old group was most at risk for burn injuries which was consistent with most other studies, although age grouping is different in different studies (2); for example in the study of Ansari *et al.* the 15-64 years old age group was most at risk (21), although in the study of Rastegar *et al*., children under 5 years old were mostly burned (5).

Our study showed a high incidence of burn injuries among children which was consistent with many other reports from Iran and other countries (2,5,9,15,20), and in some studies the frequency of burn was higher in children (15); In some studies the frequency of burns was higher in the elderly (18,19).

We observed that the majority of burns affect only small areas of the body, hence more than 87% of cases suffered less than 10% TBSA which was consistent with some studies (11,21) and lower than some other reports (14,29).

There was a significant association between TBSA burned and causes of burns consistent with other studies (2,5,21). In our study many burn injuries have taken place at home, especially while preparing or serving food, which is consistent with many other studies (2,5,14,16,17,21,22,26,30).

One of the most important and preventive causes of burns was using non-standard pressure cookers and its explosion during heating. These kinds of pressure cookers are very common in Yazd because of low price. So educating parents and children may prevent many of these injuries.

Another important and preventive cause of burn in this study was contact with motor cycle exhaust pipe, because motor cycle is a common vehicle for some families in Yazd. Covering the exhaust pipe can easily prevent this injury.

In this study a significant amount of burn injuries were due to occupational causes which was much higher than occupational burns in other studies (5). It can be explained by this fact that Yazd is an industrial province with many industrial settings. In our study second degree burns were more common than other degrees,

although many first degree burns do not refer to the hospital.

In this study suicidal attempts were the cause of burn in about 1% of patients which was lower than Duzgun *et al.* (8).

Our study had some limitations: There is a traditional center for treating burned patients in Yazd and some people still refer to this place, and we didn't have access to their data. We couldn't follow the patients to assess long-term sequelea or disabilities. In conclusion, this study showed a high incidence of burn injuries at home and in the workplace in Yazd. The burns were mostly preventive and many of them can be prevented by parents and children education. And paying attention to the safety issues in the workplace and educating employers and employees can be a means for preventing occupational burns.

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