

## Research Article

# Characteristics of Burn Injuries in Urmia Burn Center, Iran

## Runinig Title: Burn Injuries in Urmia

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### ABSTRACTS

#### Objectives:

Burn injury is a growing public health problem in developing economies such as Iran. The objectives of the study were to identify characteristics of burn injuries in Urmia Burn Center in the province of West Azerbaijan in Iran

#### Methods:

A cross-sectional study was carried out during a 6-month period from 1st March 2008 to 1st March 2010. Demographic information was gathered from the records. Statistical analysis was done by using software SPSS. P value < 0.05 was considered significant.

#### Results:

All of 639 patients (48.3% female and 51.7% male) with burn injuries admitted were selected and their records were studied. The most admitted patients were in the 16-25 years age group (31.8%). The most common cause of burning was burning with flame accounted for 36.4% of admissions in males and 43.6% in females. Overall mortality was 25.9%. The percent of patients who had more than 40% BSA burned was 30.9%. Patients with > 40% BSA burn had a mortality of 76.7%. The mean body surface area burned was 33.8% in males and 25.2% in females. Our results showed that *P. aeruginosa* was the leading cause of nosocomial infections.

#### Conclusion:

A well-targeted prevention campaign program to reduce high mortality and nosocomial infections in this environment by assessment and monitoring of burn wounds infections in burn centers is recommendable.

**Key words:** Characteristics, Burn Injuries, Urmia, Burn Center, Iran

### INTRODUCTION:

Burn injury is an increasing and growing public health problem in developing economies such as Iran that ranks high among injuries suffered by man that for these three problems: ignorance, poverty and disease have many complications(1, 2). It is one of the most dangerous of all injuries as a major public health crisis and the fourth most common type of trauma in the world, after car accidents, falling, and violence in the society(3).As a following burn injuries mainly

due to the immunocompromising effects of burns, prolonged hospital stays, and intensive diagnostic and therapeutic procedures, infection is common.(4). In many burn centers across the world, *Pseudomonas aeruginosa* is the most frequently cultured organism from infected burn wounds(5). This research was designed to study characteristics of burn injuries in Urmia Burn Center, Iran over one year to help in devising strategies towards burn and nosocomial infection

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prevention and cost effective management in developing regions like West Azerbaijan province in Iran.

In our study, burn admission in a year were analyzed in Imam Khomeini Hospital in Urmia (center of province) as a burn care center catering for all of the province burn patients. In our study characteristics of high risk persons, together with risk factors in the environment were identified to provide a basis for planning effective prevention. Such information is therefore essential to design preventive programs for our region.

#### **MATERIALS AND METHODS:**

The province of West Azerbaijan has a cold climate, because of its location in the north altitude in Iran. It must be said that only one burn center is located in Imam Khomeini Hospital in Urmia, the center of province that all important burn cases are referred to it from all of cities in this region and admitted immediately after burn injuries. A retrospective study was done and data was gathered by analyzing medical records of 639 patients hospitalized in burn ward from 1<sup>st</sup> March 2008 to 1<sup>st</sup> March 2010. One of the authors checked medical records for all patients in this study and information was obtained and collected using a data collection form for demographic characteristics and method of burning, dates of admission and discharge, total body surface area (TBSA) burned, cause, degree and type of burn injury, length of stay, nosocomial infection existence and outcome of treatment. Differences between and among various groups were evaluated using Student's t-test or the chi-square test. The level of significance was set at 0.05. Statistical analysis was performed using software SPSS. P value < 0.05 was considered significant. Ethical issues were considered by permitting from the patient and his/her family if necessary.

#### **RESULTS:**

In this descriptive study, 639 patients (48.8% female and 51.2% male) with burn injuries were admitted from 1<sup>st</sup> March 2008 to 1<sup>st</sup> March 2010, to our unit. The incidence rate of burn hospitalization was 21.6 per 100000 of population during one year. The overall incidence rate of burn hospitalization was 21.6 per 100000 of population. Almost 31.8% of admissions were in the 16-25 years age group. Pediatric (<5 years) and geriatric (>65 Years) burns were (21.6%) and (3.2%), respectively. Burning with flame accounted for 36.4% of admissions in males and 43.6% in females was the most common cause of burning. Overall mortality was 25.9%. The percent of patients who had more than 40% BSA burned was 30.9%. Patients with >40% BSA burn had a mortality of 76.7%. The mean body surface area burned was 33.8% in males and 25.2% in females. Admissions from Urmia were the most among the cities of province. Mean duration of hospitalization was 7.76±0.14 days. The most cases occurred in Aban (22 Oct – 20 Nov) (10.95%) and Tir (21 Jun-21 July) (9.54%). Fifty percent of burns injured were from Urmia district. The most common cause of burn in males was flame (36.4%), followed by hot fluids (32.4%), and chemical materials (15.1%), whereas in females, the most common cause was flame (43.6%) followed by hot fluids (31.6%), and electricity (15.9%).

The mean age for all burn patients was 23.6 ± 0.12years old, and its range was from under 1 to 83 years old. The male to female ratio was 1.05:1. The majority of burns (31.7%) occurred in 16-25 years age group followed by 0 - 5 year's age group (20.6%) and 26-35 years age group (14.2%).

The range of percentage of TBSA burned varied from 1% to 100% with a mean of 32.3% ± 1.84% (**Table 1**). The mean length of stay of patients was 7.76±0.14 days (ranged from 1 to 60 days) and 21.7% of them stayed more than 10

days in hospital. The mean BSA in patients with third-degree burns was significantly higher than the mean BSA in second-degree burns ( $p < 0.00001$ ). There were significant associations of mean BSA ( $p = 0.001$ ) and burn depth ( $p = 0.005$ ) with the burn type. 26% of patients (male and female) died of their burns. Female mortality was 20.4% and male mortality was 31.3%.

Case fatality rate for patients with  $<40\%$  of TBSA burned and  $\geq 40\%$  TBSA burned were 4.9% and 76.7%, respectively. The highest proportion of monthly variation occurred in

**Table 1:** Gender, Age group and TBSA burned victims

Gender	Total body surface area (%)								
		0-10	11-20	21-40	41-60	61-80	81-100	Total	
Male	Age groups	0-5 (%)	26 (50)	16 (30.8)	5 (9.6)	4 (7.7)	0 (.0)	1 (1.9)	52 (100)
		6-15 (%)	8 (20.5)	13 (33.3)	6 (15.4)	5 (12.8)	0 (.0)	7 (17.9)	39 (100)
		16-25 (%)	14 (12.4)	16 (14.2)	27 (23.9)	11 (9.7)	14 (12.4)	31 (27.4)	113 (100)
		26-35 (%)	9 (19.6)	8 (17.4)	8 (17.4)	10 (21.7)	6 (13)	5 (10.9)	46 (100)
		36-45 (%)	10 (23.8)	10 (23.8)	9(21.4)	8 (19)	2 (4.8)	3 (7.1)	42 (100)
		46-55 (%)	5 (23.8)	6 (28.6)	2 (9.5)	2 (9.5)	3 (14.3)	3 (14.3)	21 (100)
		56-65 (%)	1 (14.3)	3 (42.9)	1 (14.3)	0 (.0)	1 (14.3)	1 (14.3)	7 (100)
		>65 (%)	3 (30)	1 (10)	2 (20)	1 (10)	1 (10)	2 (20)	10 (100)
	Total	76 (23)	73 (22.1)	60 (18.2)	41 (12.4)	27 (8.2)	53 (16.1)	330 (100)	
Female	Age groups	0-5 (%)	36 (42.9)	30 (35.7)	12 (14.3)	4 (4.8)	1 (1.2)	1 (1.2)	84 (100)
		6-15 (%)	15 (40.5)	8 (21.6)	4 (10.8)	5 (13.5)	4 (10.8)	1 (2.7)	37 (100)
		16-25 (%)	27 (30)	18 (20)	13 (14.4)	8 (8.9)	13 (14.4)	11 (12.2)	90 (100)
		26-35 (%)	18 (40)	10 (22.2)	5 (11.1)	3 (6.7)	3 (6.7)	6 (13.3)	45 (100)
		36-45 (%)	7 (31.8)	3 (13.6)	5 (22.7)	2 (9.1)	1 (4.5)	4 (18.2)	22 (100)
		46-55 (%)	5 (41.7)	3 (25)	1 (8.3)	1 (8.3)	2 (16.7)	0 (.0)	12 (100)
		56-65 (%)	5 (55.6)	0 (.0)	2 (22.2)	1 (11.1)	1 (11.1)	0 (.0)	9 (100)
		>65 (%)	4 (40)	4 (40)	1 (10)	0 (.0)	1 (10)	0 (.0)	10 (100)
	Total	117 (37.9)	76 (24.6)	43 (13.9)	24 (7.8)	26 (8.4)	23 (7.4)	309 (100)	

**DISCUSSION:**

The purpose of this study was ±determining characteristics of burn injuries in Urmia Burn Center, Iran. The overall death and hospitalization due to burn injuries in West Azerbaijan province were 5.5 and 21.6 per 100000 persons - year. In Kordestan province of Iran, these rates were 4.5 and 13.5 and in Fars province of Iran, these rates were 4.6, respectively (6, 7).

Mortality rate in our study in male patients and female patients TBSA  $\geq 70\%$  were 89.6% and 85.7%, respectively. This result is confirmed by other studies(8, 9) that the most incidence rate of

November (11%), followed by July (9.6%) and March (9.3%), respectively. There also was a significant and direct association between level of literacy (low to high) and mean BSA ( $p = 0.05$ ), although this was not a uniformly linear association. There was not a statistically significant correlation between cause of burn and level of literacy ( $p = 0.6$ ). During the 48 hours after admission, approximately 306 (48%) of all wound cultures were positive. Pseudomonas aeruginosa was found to be the most common pathogen causing wound infection in 168(55%) of this study.

burns was observed in 16-25 years age group, because of insufficiencies of security preparations in work places and houses.

Females were burned less frequently than males (1:1.05). Some studies have reported different results(10, 11). However, there are other studies that confirm our findings (12-14).

The sex distribution of burn cases differs in industrialized countries, as males generally are at significantly higher risk. This might be for the higher incidence of industrial and recreational burns among males in those countries (15, 16).

In our review, flame was the most common cause of burns in adults that were confirmed by

several studies (6, 13, 15, 16). Scald is the second one. This may be explained that kerosene and gas are the most frequent fuels in work places and houses in West Azarbaijan rural districts. On the other hand, scalds were the most common type of burn among children that agrees with other studies (15-17). It may be related to very populate families, poor physical environment of houses, child neglect ion, and their inclination for touching things.

It is reported that almost 80% of admissions were in the 16-65 years age group and proportion of peditrics burns and geriatrics burns was 17.1% and 3.1%(18).Our study showed that 64.5% of patients located in 15-65 years age group and proportion of peditrics and geriatrics were 33.3% and 3.2%, respectively. Our study revealed that low incidence of burn in >65 years age group has also been reported in a studies was implicated in India (19), in Pakistan(20), Zimbabwe(10), Iran(21), Kuwait(22), and Egypt (23).

In spite of this finding, flame was found to be the most frequent agent of burn injuries in our study (59.7), in spite of reports from Japan (24) and Nigeria(25). In our study, scalds mostly affected >5 years age group (66%) and flame affect adults but, scald is the most common cause of burn in countries like Denmark and Singapore(26, 27). Because of severe dysfunction of the immune system, the patients are as susceptible to be at risk of infections that increase the possibility of gastrointestinal diseases, prolonged hospitalization and difficult diagnostic and treatment procedures. In our study, *Pseudomonas Aeruginosa* was found as the most common pathogen causing wound infection. In developing economies including Iran, it is reported that *Pseudomonas aeruginosa* is the most common pathogen in burn wards(28).

#### **CONCLUSION:**

In summary, 16-25 age groups were the highest incidence rate of burn. It is necessary to consider

programs for prevention of burn injuries by and family education on mass media like television or radio, Expressing risk situations and self-care methods in work places and homes and pay attention to prevent infection in burn wards. The first aids facilities should be available for reducing burn complications, pain and morbidity and mortality rate. Policy makers should pay attention to a specific burn unit based on nosocomial infection prevention measures like fast excision and grafting, improved nursing implementation and regular microbiological checking of the hospital's environment and staff. Burn prevention programs should be reassessed regularly to determine their efficacy. Also, culturally appropriate burn prevention programs should be focus on each population group accordingly. It should be also considered that the existence of resistant organisms is a serious risk in burn wards. Nosocomial infection control measures should be done to prevent the emergence and spread of these pathogens.

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