

## Prevalence burn injuries and risk factors in persons older the 15 years in Urmia burn center in Iran

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### Abstract

**Background:** Burn injuries in many respects is the most tragic that a person may experience. The purpose of this study was to know the burn casualties prevalence in people over 15 years old to identify the risk and predisposing factors in the province of west Azarbaijan of Iran.

**Methods:** This cross-sectional study was performed from March 2008 to March 2010. The demographic and epidemiologic information about burn and its complications were extracted from the data banks and records. Data were collected and analyzed.

**Results:** Four hundred twenty eight patients (44.9% female and 56.1% male) were studied. Most of the admissions were in 16 to 25 years age bracket. Burning with fire accounted (39.2%) of admission in males and (53.2%) in females which was the most common cause of burning. Percentage patients who had more than 40% body surface area (BSA) burned was 42.0% in males, and 30.1% in females. Patients with >40% BSA burn had a mortality of 73.8%. The mean body surface area burned was 33.8% in males and 25.2% in females. The mean duration of hospitalization was 6.19 days.

**Conclusion:** The results of this study show that the prevalence of burn injuries is relatively high with high mortality rate in those with BSA > 40%. The commonest cause of burn was fire.

**Key words:** Burn injuries, Prevalence, Risk Factors.

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Statistics say that burn injuries are a worldwide problem that ranks high among the injuries suffered by man consisting of these three problems: ignorance, poverty and diseases that have many complications (1). It is also mentioned that burn injuries are among the most devastating of all injuries and a major global public health crisis and are the fourth most common type of trauma worldwide, following traffic accidents, falls, and interpersonal violence (2, 3).

The province of West Azerbaijan has a cold climate, because of its location in the north altitude in Iran. It must be said that there is only one Burn Center which is located in Imam Khomeini Hospital in Urmia the capital center of the province where important burn cases are referred to from all cities in this region. This research was designed to study epidemiological parameters over one year to help in devising the strategies towards burn prevention and the cost effective management in developing regions like West Azerbaijan province in Iran. In our study, burn admission over a two year period was analyzed in Imam Khomeini Hospital in Urmia (capital of the Azarbaijan province) as a Burn Care Center catering for a large population from all cities of the province. In our study the 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.

## Methods

Urmia, located in the northwest of Iran, has the population of 3200000. This retrospective study was done and the data were gathered by analyzing the medical records of 428 patients (44.9% female and 56.1% male) with burn injuries admitted during the study who were hospitalized in the Burn Ward from 1<sup>st</sup> March 2008 to 1<sup>st</sup> March 2010. The age, gender, duration of hospitalization, the percentage of body surface area burned, cause and type of burn, and the outcome of treatment was studied. We were permitted by the manager of the hospital for reading the records. The differences between and among various groups were evaluated using Student t-test and the Chi-square test. The level of significance was set at  $p < 0.05$ . The prevalence of burn injuries and risk factors were determined.

## Results

Four hundred twenty eight (56% males, 44.8% females) were studied. Almost 31.8% of admissions were in the 16-25 years age group. Geriatric (>65 Years) burns were (10%) and (8%), in males and females, respectively. Burning with fire accounted for 39.2% of admissions in males and 53.2% in females was the most common cause of burn. The mean duration of hospitalization was 6.19 days. Most cases occurred in November (11.08%) and July (10.15%). Fifty percent of burn injuries was from Urmia district. In males, the most common cause of burn was fire (39.2%), followed by hot fluids (25%), and chemical materials (18.33%) and in females, the most common cause was flame (53.2%) followed by hot fluids (16.4%), and chemical materials (18.6%) (Table 1).

**Table 1: Distribution of Patients by Gender and Type of Burning**

Gender		Cause of burn					Total	
		Hot fluids	Electricity	Flame	Hot Surfaces	Chemical Materials		
Male	Age	16-25	22 (19.4)	8 (7)	44 (39)	14 (12.9)	25 (22.1)	113(100)
		26-35	12 (27)	4 (8.6)	18 (39)	4 (8.6)	8 (17.3)	46 (100)
		36-45	10 (24)	2 (4.5)	22 (52.3)	2 (4.5)	6 (14.3)	42 (100)
		46-55	10 (47.6)	1 (4.7)	4 (19)	3 (14.2)	3(14.2)	21 (100)
		56-65	3 (42.8)	0 (0)	2 (28.5)	2 (14.2)	1 (14.2)	8 (100)
		>65	3 (33)	0 (0)	4 (40)	2 (20)	1 (10)	10 (100)
		Total (%)	60 (25)	15 (6.25)	94 (39.2)	27 (11.25)	44 (18.33)	240 (100)
Female	Age	16-25	10 (%11.1)	4 (%4.4)	60 (%66.6)	4 (%4.4)	12 (%13.3)	90 (%100)
		26-35	6 (%13.3)	1(%2.2)	23 (%51.1)	1 (%2.2)	14 (%31.1)	45 (%100)
		36-45	4 (%18.1)	1 (%4.5)	9 (%41)	3(%13.6)	5 (%22.7)	22 (%100)
		46-55	3 (%25)	0 (%0)	4 (%33.3)	3 (%25)	2 (%16.7)	12 (%100)
		56-65	5(%45.5)	0 (%0)	2 (%18.8)	3 (%27.2)	1 (%9)	11 (%100)
		>65 (%)	3 (37.5)	0 (%0)	2 (%25)	2 (%25)	1 (%12.5)	8 (%100)
		Total (%)	31 (%16.4)	6 (%3.2)	100(%53.2)	16 (%8.5)	35 (%18.6)	188 (%100)

The mean body surface area burned was 33.8% in males and 25.2% in females. According to table 3, the percent of patients with more than 40% BSA (burn surface area) burned was 42.9% and 30.1% in males and females, respectively. Patients with >40% BSA burn had a mortality of 73.8%.

The mean age for all burn patients was 23.6 years old and its range was from under 1 to 83 years old. The male to female ratio was 1.27:1. The majority of burns (47.4%) occurred in 16-25 years age group followed by 26-35 years age group (21.1%).

**Table 2. Shows the distribution of number of burns in different age groups in males and females.**

Age (years)	Number of Patients		Total (%)
	Male (%)	Female (%)	
16-25	112 (47.5)	90 (47.9)	202 (47.4)
26-35	46 (19.3)	44 (23.4)	90 (21.1)
36-45	41 (17.2)	22 (12)	63 (14.7)
46-55	21 (8.8)	11 (6)	32 (7.5)
56-65	8 (3.3)	10 (5.4)	18 (4.2)
>65	10 (4.2)	11 (6)	21 (4.9)
Total	238 (100)	188 (100)	426 (100)

The range of percentage of TBSA (Total Body Surface Area) burned varied from 1% to 100% with a mean of  $28.9 \pm 1.15$  (Table 3)

The mean length of stay of patients was 6.19 days (ranged from 1 to 60 days) and 17.8% of them stayed more than 10 days in the hospital. The mean BSA in patients with third-degree burns was significantly higher than the mean BSA in second-degree burns ( $p < 0.001$ ). There were significant associations of mean BSA ( $p = 0.001$ ) and burn

depth ( $p = 0.005$ ) with the burn type. Female mortality was 18.3% and male mortality was 26.9%.

Case fatality rate for patients with  $< 40\%$  of TBSA burned and  $\geq 40\%$  TBSA burned were 3.1% and 57.2%. There was also a significant and direct association between the level of literacy (low to high) and mean BSA ( $p = 0.05$ ), although this association was not uniformly linear. No statistically significant correlation was found between level of literacy and cause of burn ( $p = 0.6$ ).

**Table 3: Distribution of Patients by Gender, Age, Group and TBSA**

Gender		Total Body Surface Area (%)						Total	
		0-10	11-20	21-40	41-60	61-80	81-100		
Male	Age	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	42 (17.5)	44 (18.4)	49 (20.5)	32 (13.3)	27 (11.2)	44 (18.4)	239 (100)
Female	Age	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	64 (34.1)	38 (20.2)	27 (14.3)	15 (7.9)	21 (11.1)	21 (11.1)	188 (100)

## Discussion

The purpose of this study was to report the epidemiology of burn injuries and their etiologic factors. The strength of the study was rapid sample gathering and limitations were incorrect and incomplete data from the patients or their records. The overall death and hospitalization due to burn injuries in West Azerbaijan province was 5.5 and 21.6 per 100000 persons - year. In Kordestan province these rates were 4.5 and 13.5 and in Fars province were 4.6 and 13.4 per 100000 person-years (4,5).

The mortality rate in our study in male and female patients TBSA  $\geq 70\%$  was 83.7% and 80.8%, respectively and is similar to the findings of other studies (6,7). Females were burned less frequently than males (1:1.27). Some studies have reported different results (8, 9). However, there are other studies that confirm our findings (10-12). In industrialized countries, the sex distribution of burn cases

differs, where males generally have a significantly higher risk. This might be explained by the higher incidence of industrial and recreational burns among males in such countries (13, 14).

The mean duration of hospitalization was 6.19 days. In another research, the mean length of hospital stay was 12 days (ranging from a few hours to 171 days (15).

In our review, fire was the most common cause of burns in adults that were confirmed by several studies (4,11,13,14,16) that followed by scald. This may be explained that kerosene and gas are the most frequent fuels in houses and work places in Iran.

Ahuja et al. had reported that almost 80% of admissions were in the 16-65 years age group and the proportion of geriatric burn was 17.1% and 3.1%.(17) Our study revealed that low incidence of burn in  $> 65$  years age group had also

been reported in a stud which was implicated in India, Pakistan, Zimbabwe, Iran, Kuwait, and Egypt (18-22).

In spite of this finding, fire was found to be the most frequent agent of burn injuries in our study (59.7), in spite of reports from Japan (23) and Nigeria (24). Scald is the most common cause of burn in countries like Denmark and Singapore (25, 26), but in our study was not so important.

In summary, the highest incidence rate of burn was in 16-25 age groups. It is necessary to implement programs for health education relating to prevention of burn injuries by means of broadcast flashes on mass media like television or radio, showing risk situations and teaching self-care methods in workplaces and homes together with epidemiological data about burn accidents and sentences to call attention to prevent burn accidents. The implementation of an education program for burn prevention and first aids has been proven to be useful in stopping the burning process, reducing post burn hyperthermia and pain and morbidity. Policy makers should evaluate the need for a specific burn unit. Burn prevention programs in Urmia should be reassessed to determine their efficacy and if they target the high risk populations. Culturally appropriate burn prevention programs should target each population group accordingly. Parents of infants should be exposed to prevention programs in an effort to reduce scald injuries. Prevention programs for the population are implemented before the winter months.

In conclusion the result of our study showed that the prevalence of burn injuries is relatively high with high mortality rate in those with BSA > 40%. The commonest cause of burn was fire.

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### Conflict of interest

None declared.

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