

## ORIGINAL

# Frequency of burns and its causes in Kermanshah, Iran

*Frecuencia de las quemaduras y sus causas en Kermanshah, Irán*

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**Abstract**

**Introduction:** Burn is one of the public health problems and one of the major causes of death in Iran, which causes many physical and psychological disabilities. The aim of this study was to investigate Frequency of burns and its causes in Kermanshah province.

**Methods:** This is a descriptive -analytical cross-sectional study. Data were obtained from the burn data record center of Kermanshah province. 490 patients were studied in this research. A designed checklist was used for data collection. Data analysis was performed using SPSS 22.

**Results:** The mean age of patients was 17.01 years. Most burns (28.6% of the patients) were caused by oil and gasoline. 65.5% of patients had 25% to 50% burning rate. Remedial measures taken for 44% (44.1%) of patients were debridement.

**Conclusion:** Since burn is more prevalent in childhood and adolescence, it is necessary to provide policy interventions and required trainings to this at-risk group to prevent burn incidence.

**Keywords:** Burn incidence, Burn etiology, Kermanshah.

**Resumen**

**Introducción:** Las quemaduras son uno de los problemas de salud pública y una de las principales causas de muerte en Irán, que provoca muchas discapacidades físicas y psicológicas. El objetivo de este estudio fue investigar la frecuencia de las quemaduras y sus causas en la provincia de Kermanshah.

**Métodos:** Se trata de un estudio transversal descriptivo-analítico. Los datos se obtuvieron del centro de registro de datos de quemaduras de la provincia de Kermanshah. Se estudiaron 490 pacientes en esta investigación. Se utilizó una lista de comprobación diseñada para la recogida de datos. El análisis de los datos se realizó con el programa SPSS 22.

**Resultados:** La edad media de los pacientes fue de 17,0 años. La mayoría de las quemaduras (28,6% de los pacientes) fueron causadas por aceite y gasolina. El 65,5% de los pacientes tenían entre un 25% y un 50% de quemaduras. Las medidas correctoras adoptadas en el 44% (44,1%) de los pacientes fueron el desbridamiento.

**Conclusiones:** Dado que las quemaduras son más frecuentes en la infancia y la adolescencia, es necesario proporcionar intervenciones políticas y la formación necesaria a este grupo de riesgo para prevenir la incidencia de quemaduras.

**Palabras clave:** Incidencia de las quemaduras, etiología de las quemaduras, Kermanshah.

## Introduction

Burn is one of the main and common health problems throughout world especially in the developing countries. According to International Society for Burn Injuries, burn is defined as disruption of a part or all cell layers in skin as the result of contact with hot liquid or solid materials. Generally, 195.000 cases of death occur annually due to burn throughout the world. Burn is of the most important accidents and disasters that relates to the human health that took more attention because of the severe complications and the number of mortality<sup>1</sup>. Burn is the tissue injury because of the heat, chemical or electrical contact that leads to the change in protein, edema, and reduction in intravascular liquid volume. Burns are always considered as one of the most destructive damage. Not only do they lead to death and disability, they have major psychological and economic consequences and long-term severe physical complications<sup>2</sup>. The severity of injury varies from a superficial injury to the full-thickness injuries that threaten life. Psychological problems and deformation physical changes such as scars, contractures and organs' removal are often the consequences of burns so the burns are of the most expensive damage in terms of economic matters<sup>3</sup>. In Iran, burns' damage is highly prevalent and leads to death because 8 people die per day due to burn. Burns are the third factor of mortality followed by driving accidents and trauma<sup>2</sup>. However, compensation of losing physical performance or psychological damage and beauty defects is not computable<sup>4</sup> and it brought about a big challenge for Iran's health system in case of treatment and rehabilitation of patients<sup>5</sup>. Although the recent developments saved many lives, many patients are in pain of its complications<sup>6</sup>. Annually, more than 11 million people face burn with the severity that requires medical intervention. WHO (2011) reported that more than 300.000 people die in the world because of burn complications<sup>7</sup>. In addition, 1.250.000 people experience burn in the U.S. that need medical care. About 50.000 of them are admitted in the hospitals and it costs 7 B\$<sup>8</sup>. The statistics in Iran indicate that 2749 people were admitted in Shahid Motahhari Burn Treatment Center in 2008 and it reached 1929 patients during March 2009 to December 2009, a considerable extent<sup>9</sup>. A study on 2257 burns in Chaharmahal and Bakhtiari Province in 2012 showed 55.57% female and 44.43 % male burns<sup>10</sup>. In Feck's study, the average amount of burn was 9%; the most dangerous groups were men, dark skin and youth being burnt during work<sup>11</sup>. Lie reported internal organ disorder, severe infections, and respiratory damage as the most prevalent causes of death due to burn<sup>12</sup>. Faramarzi et al. (2012) reported that many burns are unintentional and the average age was 36<sup>13</sup>. Soltan Dallal et al conducted an epidemiological analysis of burn in Motahhari Hospital and concluded that the most common cause of burn is the hot liquids and pseudomonas is diagnosed as the most important microbial factor<sup>14</sup>.

The aim of this study is the epidemiological and etiological analysis of burn among patients referred to Specialized Burn Hospital in Kermanshah town where is the only burn treatment center in the province in order to identify the precautionary scales and reduce the wide spectrum of mortality due to burns.

## Materials and methods

The present study is a descriptive-analytical-cross-sectional one and deals with 490 cases of patients suffered from burn during 2012-2015 in Kermanshah Emam Khomeini Hospital. Through census sampling, the statistical population includes all patients with burn that referred Kermanshah Emam Khomeini Burn Treatment Center. The research setting is Kermanshah Emam Khomeini Hospital where is the only burn treatment center in Kermanshah Province. To gather the information, a twofold checklist used which included demographic information such as age, sex, education level and occupation; geographic information such as province, city and region of residence; and information on burn such as burn severity and degree, burn percentage and regions, burn cause, and finally the clinical consequences for patients. To collect the data, the comprehensive program of recording burn information in Emam Khomeini Hospital, analysis of patients' cases, interview with patients and telephone contact with patients were utilized. Data analysis was conducted with SPSS®-16. Statistical tests on descriptive analysis such as mean, standard deviation, and frequency were used to describe the variables. Chi-2 test was used for information analysis. In this study, p-value < 0.05 is significant.

## Results

**Table I** shows the absolute Frequency and Relative Frequency Percentage of demographic variables in patients.

**Table I:** Absolute Frequency and Relative Frequency Percentage of demographic variables in patients.

Variables		Absolute Frequency (Relative Frequency Percentage)
Gender	Man	276(56.3%)
	Female	214(43.7%)
Education	Illiterate	318(64.9%)
	Subdivision	157(32%)
	Academic	15(3.1%)
Job	Unemployed	272(55.5%)
	Housewife	132(26.9%)
	Employee	20(4.1%)
	Free	66(13.5%)
Economic situation	Weak	167(34.1%)
	Medium	281(57.3%)
	Good	42(8.6%)
Age	less than 15 years	286(58.4%)
	15-30 years	92(18.8%)
	30-45 years	56(11.4%)
	Over 45 years	56(11.4%)

In this study, information related to 490 burn patients was analyzed. Their average age is 17.01 years old with standard deviation of 20.28 years old and age range between 1 and 87 years old. The admission average is 4.86 days with standard deviation of 6.70. The admission period varied from 1 day to 80 days. 56.3% of patients were men. 56.3% of patients were women. 58.4% of patients were under 15 years old. 55.5% of patients were illiterate. 57.3% of patients were in medium economic condition.

According to **table II**, the results showed that 28.6% of burns occurred with oil and gasoline, 14.5% with gas, and 29.2% with alcohol. Additionally, 55.3% of burns were less than 25% severity and 65.5% of them were between 25% and 50% severity. 32.2% of burns were degree 1 and 23.9% of them were a combination of degrees 2, 1 and 3 burns.

**Table I:** Absolute Frequency and Relative Frequency Percentage of demographic variables in patients.

Variables		Absolute Frequency (Relative Frequency Percentage)
Burning agent	Oil and gasoline	140(28.6%)
	Gas	71(14.5%)
	Acid	3(0.6%)
	Electricity	8(1.6%)
	Alcohol	143(29.25%)
	Hot object and hot object	72(14.7%)
	Others	53(10.8%)
Percentage of burns	25%≤	271(55.3%)
	20-50%	130(26.53%)
	50-75%	59(12.04%)
	75%≥	30(6.13%)
Degree of burn	grade 1	158(32.2%)
	Grade 2	17(3.5%)
	Grade 3	149(30.4%)
	Grades 1 and 2	21(4.3%)
	Grades 1 and 3	8(1.6%)
	Grade 2 and 3	20(4.1%)
	Grades 1, 2 and 3	117(23.9%)

Fasciotomy was used for 39.6% of patients. Scarotomy was used for 41% of patients. Debridement was used for 44.1% of patients. In addition, 98.6% of patients were administered medications such as antibiotics, analgesics, and supplementary treatments. 3.1% of patients used tourniquet; 80.6% used massage; 38.4% used weights; 81.6% used position therapy; and 81.6% used respiratory physiotherapy. Psychological interview was done 25.9% of cases. Finally, the number of mortality was reported 6.9% among burn patients (**Table III**).

**Table III:** Absolute Frequency Distribution and Relative Frequency Percentage Treatment for patients.

Variables		Absolute Frequency (Relative Frequency Percentage)
Fasciotomy	Yes	194(39.6%)
	No	294(60.4%)
Scartomy	Yes	201(41%)
	No	289(59%)
Debrideman	Yes	216(44.1%)
	No	274(55.9%)
Drug treatment	Antibiotics	4(0.8%)
	Painkiller	2(0.4%)
	Reinforcement treatments	1(0.2%)
	All three	483(98.6%)
Splinting	Yes	15(3.1%)
	No	475(96.9%)
Massage	Yes	395(80.6%)
	No	95(19.4%)
Use Weights	Yes	188(38.4%)
	No	302(61.6%)
Therapy Position	Yes	400(81.6%)
	No	90(18.4%)
Respiratory Physiotherapy	Yes	400(81.6%)
	No	90(18.4%)
Psychological Interview	Yes	127(25.9%)
	No	363(74.1%)
Post-treatment status	Discharge after treatment	456(93.1%)
Actions taken	Deceased	34(6.9%)

According to **table IV**, the results of Pearson's correlation coefficient test showed there is not significant relationship between sex of patients and burn factor and the burn degree ( $p>0.05$ ). Meanwhile, the results of this test showed a significant relationship between sex and burn percentage ( $p=0.001$ ). The results of Pearson's test manifested an inverse and significant relationship between education and burn cause ( $p=0.001$ ). There is a direct and significant relationship between the burn percentage and burn degree ( $p<0.05$ ). In addition, the findings set a direct and significant relationship between the economic situation and burn cause ( $p=0.004$ ). Meanwhile, there is an inverse and significant relationship between burn percentage and burn degree ( $p<0.05$ ). There is an inverse and significant relationship between age and burn cause ( $p=0.001$ ). Pearson's test showed that there is a direct and significant relationship between age and burn percentage as well as burn degree ( $p<0.05$ ).

**Table III:** Absolute Frequency Distribution and Relative Frequency Percentage Treatment for patients.

Variables	Burning agent		Percentage of burns		Degree of burn	
	P-value	r	P-value	r	P-value	r
Gender	0.28	-0.049	0.001	0.275	0.221	0.055
Education	0.001	-0.335	0.001	0.169	0.001	0.463
Job	0.001	-0.318	0.001	0.105	0.001	0.305
The economic situation	0.004	0.129	0.001	-0.247	0.001	-0.476
Age	0.001	-0.371	0.001	0.209	0.001	0.469

## Discussion

Burn is an irreparable incident that has many physical, psychological, social and economic consequences, but in half of the cases, this incident and its complications can be prevented<sup>1</sup>. The available information is obtained from the study of 490 cases of patients admitted to Imam Khomeini Hospital in Kermanshah from 2012 to 2016. In the present study, the mean age of patients was 17.2 years, ranging from 1 to 87 years. 58.4% of patients were younger than 15 years. The age distribution of this study is similar to that of other studies, especially from childhood to middle age<sup>8,9</sup>. But in the US studies, elderly hospitalization rates were reported to be 16%, respectively<sup>10</sup>. In this study, the low rates of hospitalization in the elderly can be attributed to the cultural and religious context of the community in terms of maintaining and protecting the elderly in the family environment and consequently reducing the risk of exposure to the contributing factors to burn. On the other hand, the prevalence of burns in different age groups can be associated with the behavioral and developmental patterns of people of different ages. For example, lack of awareness and attention to hazardous substances in children plays an important role in the incidence of burns at this age. Increased incidence of burns in young adults is also justified by having an active life, exposure to work and home accidents as well as specific cultural and psychological issues of these ages<sup>11</sup>. Therefore, the need to implement training programs to prevent and reduce risk factors, especially in children and adolescent burn incidence, and to make the home environment safer is felt more than ever.

Burns were higher in men than in women, and these results have been obtained in other studies<sup>12-14</sup> as well. The higher incidence of burns in men can be attributed to their higher presence in work and hazardous occupations. The results of the present study showed that the majority of burns were caused by gasoline, oil and alcohol. Flame burns in Tehran and Hamadan were also reported as the most common cause of burns<sup>15,16</sup>, while hot liquids were the most common cause in Yazd<sup>17</sup>. The present study showed that most of the patients were unemployed and with moderate economic status. The study of Moghsoudi et al. revealed that social factors are the main cause of the increase in burns in Iran. Most burns are due to internal accidents and can be prevented. Therefore, training programs can reduce the incidence of burn injuries<sup>18</sup>. The depth of burn in the present study was higher than the first degree. In a study in Turkey, 48.7% of burns were reported to be of full thickness<sup>19</sup>. Since the depth of burn depends on factors such as the burned area, the burner (burning agent), the contact time, and the burn mode, the burn depth has also been reported differently in different centers. The average length of hospital stay was approximately 2 days. The average length of stay in Turkey was 25 days, in Tehran was 12 and 16.7 days, in

Portugal was 15.5 days, and in Kuwait was reported to be 38 days<sup>19-22</sup>. Since the length of hospital stay depends on factors such as quality and quantity of care and treatment, extent and depth of burns, age, etc., it is observed that the length of hospitalization in general as well as in the living and dead patients in the study is shorter than that of some similar studies, which can be due to patients not being scheduled for surgery, first degree burns in most patients, etc. The duration of hospitalization in children was shorter than in adults, which may be due to lesser extent of burns in these patients. In terms of remedial measures taken, debridement was performed for most patients. Most patients also received pharmacological treatments including antibiotics, analgesics, and booster treatments. In most patients, massage, position therapy, and respiratory physiotherapy were used. 38.8% of patients and 35.6% of patients had surgery in Turkey and Saudi Arabia, respectively<sup>19,23</sup>. Fewer surgeries at this center can be due to the lack of debridement and early transplantation, the lack of surgeons, the lack of treatment facilities, and the lack of skin for transplantation. The results of this study can provide relevant information about the status of burn patients to the health care centers and organs of Iran. This study can contribute greatly to the relevant organs in planning, training and treatment of burn patients.

## Conclusion

According to the results of this study, it seems that in order to reduce the incidence of burns, more focus should be placed on education, social status and appropriate job of the community. On the other hand, as most burns have occurred at home, it seems to require a public mobilization to educate the public on how to prevent burns at home. The most common cause of burns was flame with oil, gasoline and alcohol. But the main cause of burns in children was boiling water, so parents should pay particular attention to this issue. Today, in developed countries, more efforts are being made to improve the quality of burn survivors and to find new ways to treat hypertrophic scars. In developing countries, including Iran, given the basic requirement, the development of specialized multidisciplinary and focused burn centers alongside public education seems essential.

## Conflict of interests

The authors have no conflict of interest.

## References

- Church D, Elsayed S, Reid O, Winston B, Lindsay R. Burn wound infections. *Clinical microbiology reviews*. 2006;19(2):403-34.
- Sharif MR, Nouri S. Challenges in Burn Management, A Review Article. *Journal of Surgery*. 2015;22(4).
- Simons MA, Kimble RM. Pediatric Burns. In: Stone JH, Blouin M, editors. *International Encyclopedia of Rehabilitation*. [Internet] 2013 [cited 2013 Jun 15]; Available from: <http://cirrie.buffalo.edu/encyclopedia/en/article/119>
- Rahzani K, Taleghani F, Nikbakht Nasrabadi A, Maleki rad A, Rezaee K. Quality of life in burn disfigurement individuals as life in suffocation - a qualitative study. *IJNR*. 2012; 7 (26):11-22.
- Jafariparvar lashe Z. The Survey outcomes of burn and their predictors in patients with severe burns hospitalized in Velayat Sub-Speciality Burn and Plastic Surgery Center in Rasht City during 2008 to 2013. *MSC Nursing [dissertation]*. Rasht: Shahid Beheshti Nursing and Midwifery School of Rasht; 2013
- Faramarzi H, Bagheri P, Mohammadi A, Hadizadeh E. Epidemiology of burn in Fars Province in 2009. *Iranian Journal of Epidemiology*. 2012 Sep 10;8(2):54-64.
- Soltan Dallal MM, Sharifi Yazdi MK, Rahimiforushani A, Akhoondinasab MR. Epidemiology, etiology and outcomes of burn patients in a Referral Burn Hospital, Tehran. *Tehran Univ Med J*. 2016; 74 (5) :344-349.
- Panjeshahin MR, Lari AR, Talei AR, Shamsnia J, Alaghebandan R. Epidemiology and mortality of burns in the South West of Iran. *Burns*. 2001 May 1;27(3):219-26.
- Bortolani A, Barisoni D. Burns in the elderly. Epidemiology and mortality: analysis of 53 cases. *Annals of Burns and Fire Disasters*. 1997;10(4):197-9.
- Rice DP, Mckenzie EJ. Cost of Injury in the United States: A report to congress. San Francisco. Institute for Health & aging. University of California & Injury Prevention Center. The Johns Hopkins University, 1989.
- Al-Shlash S, Warnasuriya ND, Al Shareef Z, Filobbos P, Sarkans E, Al Dusari S. Eight years' experience of a regional burns unit in Saudi Arabia: clinical and epidemiological aspects. *Burns*. 1996 Aug 1;22(5):376-80.
- Bang RL, Mosbah KM. Epidemiology of burns in Kuwait. *Burns*. 1988 Jun 1;14(3):194-200.
- Tabie Sh, Nakhaei M. Epidemiology of burn patients admitted to the burn ward of Imam Reza Birjand Hospital, 1998-2003. *Shahrekord University of Medical Sciences*. 6(1): 43-55, 2005.
- Sheikhazadi A, Kiani M, Ghdyani MH. Electrocution-related mortality: a survey of 295 deaths in Tehran, Iran between 2002 and 2006. *The American Journal of Forensic Medicine and Pathology*. 2010 Mar 1; 31(1):42-5.
- Mohammadi-Barzelighi H, Alaghebandan R, Motevallian A, Alinejad F, Soleimanzadeh-Moghadam S, Sattari M, Lari AR. Epidemiology of severe burn injuries in a Tertiary Burn Centre in Tehran, Iran. *Annals of burns and fire disasters*. 2011 Jun 30;24(2):59.
- Torabian S, Saba MS. Epidemiology of paediatric burn injuries in Hamadan, Iran. *Burns* 2009;35(8):1147-51.
- Mirmohammadi SJ, Mehrparvar AH, Jalilmanesh M, Kazemeini K, Delbari N, Mostaghaci M. An epidemiologic survey on burns in Yazd from 2008 till 2009. *Acta Med Iran* 2012;50(1):70-5.
- Maghsoudi H, Gabraely N. Epidemiology and outcome of 121 cases of chemical burn in East Azarbaijan province, Iran. *Injury* 2008;39(9):1042-6.
- Anlatıcı R, Özerdem ÖR, Dalay C, Kesiktaş E, Acartürk S, Seydaoğlu G. A retrospective analysis of 1083 Turkish patients with serious burns. *Burns*. 2002 May 1;28(3):231-7.
- Alaghebandan R, Rossignol AM, Rastegar Lari A. Paediatric burn injuries in Tehran, Iran. *Burns* 2000; 27: 28-32.
- Natividade da Silva P, Amrante J, Costa-Ferreira A, Reis JS. Burn patients in Portugal: analysis of 14797 cases during 1993-1999. *Burns* 2003; 29: 265-69.
- Bang RL, Ghoneim IE. Epidemiology and mortality of 162 major burns in Kuwait. *Burns* 1996; 22: 433-38.
- Almarghoub MA, Alotaibi AS, Alyamani A, Alfaqeeh FA, Almeheid FF, Al-Qattan MM, Kattan AE. The Epidemiology of Burn Injuries in Saudi Arabia: A Systematic Review. *J Burn Care Res*. 2020 Sep 23;41(5):1122-1127.