

ORIGINAL RESEARCH

Independent Predictive Factors of Hospitalization in a North-West Burn Center of Iran; an Epidemiologic Study

Samad Shams Vahdati^{1*}, Bita Hazhir Karzar², Negar Momen²

1. Road Traffic injury research center, Assistant professor of emergency medicine, Tabriz University of medical science, Tabriz, Iran.
2. Education Development Center and Talented Students' Office, Tabriz University of Medical Science, Tabriz, Iran.

*Corresponding Author: Samad Shams Vahdati; Assistant Professor of Emergency Medicine, Tabriz University of Medical Sciences, Tabriz, Iran.

Tel: +989141156941; Email: sshamsv@yahoo.com; shams@tbzmed.ac.ir

Received: July 2014; Accepted: September 2014

Abstract

Introduction: A high-grade burn is one of the most devastating injuries with several medical, social, economic, and psychological effects. These injuries are the most common cause of accidental deaths after traffic injuries in both the developed and developing countries. Therefore, this research was aimed to determine demographic characteristics of patients with burn injury admitted to the emergency department and identify predictive factors of hospitalization. **Methods:** This is a cross sectional descriptive study, which is done in 20 March up to 20 September 2011 in emergency department of Sina Hospital, Tabriz, Iran. Patients' information including demographic characteristic, cause of burn, place of accident, anatomical areas burned, grading and percent of burning and disposition were gathered and analyzed using SPSS version 18.0 statistical software. Stepwise multivariate regression analysis was used for recognition of independent predictive factors of hospitalization in burned patients.

Results: One hundred and sixty patients were enrolled (54.4% female). The average age of those was 20.47±13.5 years. The prevalence of burn was significantly higher in ages under 20 years ($p<0.001$). Lower limb (37.5%), head and neck (21.25%) and upper limb (17.5%) were three frequent site of burn. The most common cause of burns was boiling water scalding (34.4%). Home related burn was significantly higher than other place ($p<0.001$). The most frequent percent of burn was <5% (46.25%). Finally, 50 (31.25%) cases hospitalized. Univariate analysis demonstrated that age under 20 years old ($p=0.02$) female gender ($p=0.02$), burning site ($p=0.002$), cause ($p=0.005$), place ($p<0.001$), grade ($p<0.001$), and percent ($p<0.001$) was related to disposition of patients. Stepwise multiple logistic regression showed female gender (OR=3.52; 95% CI: 1.57-7.88; $p=0.002$), work related burning (OR=1.78; 95% CI: 1.26-2.52; $p=0.001$), and burning over 5 percent (OR=2.15; 95% CI: 1.35-3.41; $p=0.001$) as independent predictive factors of hospitalization. **Conclusion:** The results of present study showed that burns injury are most frequent in age under 20 year old, lower limbs, with boiling water, and at home. In addition, the most frequent type and percentage of burned area were second degree and <5% of total body surface area, respectively. Among age under 20 years old, female gender, burning site, cause, place, grade, and percent only female gender, work related burning, and burning over 5% were detected as independent predictive factors of hospitalization.

Key words: Epidemiology; burn units; hospitalization; risk factors; emergency department

Cite this article as: Shams Vahdati S, Hazhir Karzar B, Momen N. Independent Predictive Factors of Hospitalization in a North-West Burn Center of Iran; an Epidemiologic Study. *Emergency*. 2015;3(1):40-4.

Introduction:

A high grade burn is one of the most devastating injuries with several medical, social, economic, and psychological effects (1). These injuries are the most common cause of accidental deaths after traffic injuries in both developed and developing countries (2). The patients with widespread burning damage die, but others suffer from prolonged recoveries (3). The survived patients require various operations with a

long-term hospitalization and readmission. Understanding the relationship between the host-environment and harmful agent can help designing preventive programs (4). Such injuries occur in specific geographic and demographic patterns (5, 6). In all age groups men had higher percentage of admission than women (2, 7). In some studies most of burn events appeared in children under 5 years (7, 8). Home was the most common place of the events and scalding as well



as flame the most frequent cause (2, 7-10). No burn study has yet been performed in the North-West of Iran. Therefore, this research was undertaken to determine demographic characteristics of patients with burn injury admitted to the emergency department of Sina Hospital, the burn center of North-West of Iran and identify populations at increased risk.

Methods:

This cross sectional study was done through 20 March to 20 September 2011 in the emergency department of Sina Hospital, Tabriz, Iran. Sina Hospital is a burning center of North-West of Iran and the only burning hospital of Tabriz. Data of patients attending the hospital with any burn injury were collected on a checklist included: patient characteristic, cause of burn, place of accident, disposition, anatomical areas, and grading and percent of injury. Burning grading was divided into I, IIa, IIb, III and IV degrees (11). Types of injuries included were boiling water, gas, electrical, oil, chemical and other burns were treated on an inpatient or outpatient basis in the hospital. The protocol of study was approved by ethical committee of Tabriz University of Medical Sciences. Authors were adhered to ethical principles of Helsinki declaration in all parts of study. Informed consent forms were fulfilled for all participants.

Statistical analysis

Data were analyzed using SPSS version 18.0 statistical software. Descriptions of qualitative and quantitative variables were respectively performed by frequency tables and calculation of mean± standard deviation. Chi-squared test was used to compare qualitative variables and independent t-test for quantitative. Univariate analysis was applied to evaluation of predictive factors of hospitalization. Stepwise multivariate regression analysis was used for recognition of independent predictive factors of hospitalization in burned patients. Statistical significance was defined as $p < 0.05$.

Results:

One hundred and sixty patients were enrolled (54.4% female). Table 1 shows baseline characteristics of studied patients. The average age of cases was 20.47 ± 13.5 years. Most of the patients were under 20 years old (56.9%). The multinomial logistic regression showed a significant difference among burn prevalence in age groups ($p < 0.0001$). Based on this analysis, the prevalence of burn was significantly higher in ages under 20 years ($p < 0.001$). Lower limb (37.5%), head and neck (21.25%), and upper limb (17.5%) were three frequent sites of burn. Lower limb burn was significantly higher than other organs ($p < 0.001$). The most common cause of burns was boiling water scalding (34.4%), followed by hot oil (16.9%) and gas contact (16.9%) ($p = 0.001$). Seventy-three (45.6%) cases of burns occurred at home, 39 (24.4%) outdoors, and 30 (18.75%) workplace. Home related burn was significantly higher than

other places ($p < 0.001$). Forty-nine (30.6%) patients have first-degree of burn, 67 (41.9%) second-degree, 36 (22.5%) third degree, and 8 (5.0%) fourth-degree. Multinomial logistic regression showed that the prevalence of second-degree burns were significantly higher than third degree ($p = 0.003$) and fourth degree ($p < 0.001$). The most frequent percentage of burn was $< 5\%$ (46.25%) that is significantly more than 5-10% ($p = 0.009$) and $> 10\%$ ($p = 0.002$). Finally, 50 (31.25%) cases were hospitalized. Table 2 shows the relation between disposition of patients and clinical and demographical variables. Univariate analysis demonstrated that age under 20 years old ($p = 0.02$), female gender (39.1; $p = 0.02$), burning site ($p = 0.002$), burning cause ($p = 0.005$), burning place ($p < 0.001$), grade of burning ($p < 0.001$), and the percent of burning ($p < 0.001$) were related to disposition of patients. Stepwise multiple logistic regression showed female gender (OR=3.52;

Table 1: The baseline variable of studied patients

Variable	N (%)
Age (year)	
1-10	44 (27.5)
11-20	47 (29.4)
21-30	36 (22.5)
31-40	21 (13.1)
>40	12 (7.5)
Gender	
Male	73 (45.6)
Female	87 (54.4)
Site of Burn	
Lower limb	60 (37.5)
Head and neck	34 (21.25)
Upper limb	28 (17.5)
Thoraces	25 (15.6)
Back trunk	7 (4.4)
Abdomen	6 (3.75)
Cause of burn	
Boiling water	55 (34.4)
Oil	27 (16.9)
Gas	27 (16.9)
Electrical burning	23 (14.4)
Others	28 (17.5)
Place of injury	
Home	73 (45.6)
Work	30 (18.75)
Out door	39 (24.4)
Others	18 (11.25)
Grade	
I	49 (30.6)
II	67 (41.9)
III	36 (22.5)
IV	8 (5.0)
Percent of burn*	
< 5%	74 (46.3)
5-10 %	45 (28.1)
>10%	41 (25.6)

* Total body surface area



Table 2: Relation of baseline variable of studied patients and disposition

Variable	Disposition		p-value
	Discharged	Hospitalized	
Age (year)			
1-10	34 (77.3)	10 (22.7)	0.02
11-20	28 (59.6)	19 (40.4)	
21-30	21 (58.3)	15 (41.7)	
31-40	15 (71.4)	6 (28.6)	
>40	12 (100.0)	0 (0.0)	
Gender			
Male	57 (78.1)	16 (21.9)	0.02
Female	53 (60.9)	34 (39.1)	
Site of Burn			
Lower limb	44 (73.3)	16 (26.7)	0.002
Head and neck	21 (61.8)	13 (38.2)	
Upper limb	21 (75.0)	7 (25.0)	
Thoraces	18 (72.0)	7 (28.0)	
Back trunk	0 (0.0)	7 (100.0)	
Abdomen	6 (100.0)	0 (0.0)	
Cause of burn			
Boiling water	45 (81.8)	10 (18.2)	0.004
Oil	12 (44.4)	15 (55.6)	
Gas	15 (55.6)	12 (44.4)	
Electrical burning	16 (69.6)	7 (30.4)	
Others	22 (78.6)	6 (21.4)	
Place of injury			
Home	61 (83.6)	12 (16.4)	<0.001
Work	13 (43.3)	17 (56.7)	
Out door	29 (74.4)	10 (25.6)	
Others	7 (38.9)	11 (61.1)	
Grade			
I	46 (93.9)	3 (6.1)	<0.001
II	33 (48.25)	34 (50.75)	
III	27 (75.0)	9 (25.0)	
IV	4 (50.0)	4 (50.0)	
Percent of burn			
< 5%	64 (86.5)	10 (13.5)	<0.001
5-10 %	21 (46.7)	24 (53.3)	
>10%	25 (61.0)	16 (39.0)	

95% CI: 1.57-7.88; $p=0.002$), work related burning (OR=1.78; 95% CI: 1.26-2.52; $p=0.001$), and percent of burning over 5% (OR=2.15; 95% CI: 1.35-3.41; $p=0.001$) as independent predictive factors of hospitalization (Table 3).

Discussion:

The results of present study showed that burn injuries are more common in age less than 20 years old, in lower limbs, with boiling water, and at home. In addition, the most frequent type and percentage of burned area were second degree and <5% of total body surface area, respectively. Among age under 20 years old, female gender, burning site, burning cause, burning place, grade of burning, and percent of burning only female gender, work related burning, and percentage of burning over 5% were identified as independent predictive factors of hospitalization.

Burns are one of the serious preventable events (12, 13). This study was the first research on burn injury in

the North-West of Iran. We focused on those patients who attended to the emergency department of Sina Hospital. The findings of present study revealed that most of burn patients were aged 20.47 ± 13.5 years. The mean age of burn patients is different from 19 to 35 years in various studies. In most papers this age was reported between 21 and 23 years old (14). Generally, young adults are active both at home and at work and this may be susceptible them to hazardous situations. Most of cookers with 20-47years old are not expert, one of the reasons that this age group is more disposed to burn events. Because of social structure in our country, older people usually live with their family and thus their exposure to hazardous situations has been greatly reduced. This might be explained why they have low percentage of accidents in the present study. Females had higher incidence in this study as other ones (3, 15, 16) contrasts with others (17-21). It seems that some of factors such as culture and career have more effects on



Table 3: Independent predictive factors of hospitalization in studied patients

Variable	Odds ratio	95% confidence interval	P-value
Female gender	3.52	1.57-7.88	0.002
Work related burning	1.78	1.26-2.52	0.001
Percent of burning > 5 %	2.15	1.35-3.41	0.001

the gender predominance in burn injuries. Home was the most common sites of burns. Similar to most Iranian studies (14), the highest percentage of burning place in this research was at home as well. This findings are comparable to other reports from developing countries (22, 23). In developed countries because of safer cooking devices this results are lower than developing countries. Developed countries have more occupational burn events (24, 25). This study showed that the most common cause of burn is scalding like other studies (4, 7, 17, 19, 26-29) unlike other researches (2, 3, 8, 9, 30-33). Cooking and repairing the car radiator is more frequent cause of burning, occur with boiled water. In poor countries electricity and scalding are common causes of burn events (18). Burning under 5% is more common than other types (4), dissimilar to other studies (7-9, 17). Because patients are not in danger to have high grade and high percent burning illness, and of course outpatient is more frequent than disposition. In this study the most common anatomical area burned is lower limb unlike previous reports (7, 26). Since using boiled water either in cooking or repairing the car radiator is in standing position, the most common burning site is lower limb. Thus, for such cases it was suggested to change the life style and manage oil and heat resources of houses (34).

Conclusion:

The results of present study showed that burns injury are most frequent in age under 20 year old, lower limbs, with boiling water, and at home. In addition, the most frequent type and percentage of burned area were second degree and <5% of total body surface area, respectively. Female gender, work related burning, and percentages of burning over 5% were detected as independent predictive factors of hospitalization.

Acknowledgments:

None.

Conflict of interest:

None

Funding support:

None

Authors' contributions:

All authors passed four criteria for authorship contribution based on recommendations of the International Committee of Medical Journal Editors.

References:

- Königová R. Factors influencing survival and quality of life in burns. *Acta Chir Plast.* 1995;38(4):116-8.
- Asuquo ME, Ekpo R, Ngim O. A prospective study of burns trauma in children in the University of Calabar Teaching Hospital, Calabar, south-south Nigeria. *Burns.* 2009;35(3):433-6.
- Akther J, Nerker N, Reddy P, Khan M, Chauhan M, Shahapurkar V. Epidemiology of burned patients admitted in burn unit of a rural tertiary teaching hospital. *Pravara Med Rev.* 2010;5:11-7.
- Feck G, Baptiste MS. The epidemiology of burn injury in New York. *Public Health Rep.* 1979;94(4):312-9.
- Wigglesworth E. Injury control: A state-of-the-art review. *Aust N Z J Surg.* 1977;47(2):248-51.
- Haddon W. Energy damage and the ten countermeasure strategies. *Hum Factors.* 1973;15(4):355-66.
- Xin W, Yin Z, Qin Z, et al. Characteristics of 1494 pediatric burn patients in Shanghai. *Burns.* 2006;32(5):613-8.
- Rouzbahani R, Omranifard M, Rouzbahani A, Barkhordari M. An epidemiological study on burned patients admitted in the burn hospital in Isfahan province, Iran in 2002. *Rawal Med J.* 2004;29:13-7.
- Dongo AE, Irekpita EE, Oseghale LO, Ogbebor CE, Iyamu CE, Onuminya JE. A five-year review of burn injuries in Irrua. *BMC Health Serv Res.* 2007;7(1):171-7.
- Aksoy N, Arli S, Yigit O. A Retrospective Analysis of the Burn Injury Patients Records in the Emergency Department, an Epidemiologic Study. *Emergency.* 2014;2(3):115-20.
- Tintinalli JE, Stapczynski JS, Cline DM, Ma OJ, Cydulka RK, GD. M. Tintinalli's emergency medicine, a comprehensive study guide. 7th ed. China: McGraw Hill; 2011. p. 201-3.
- Cronin K, Butler P, McHugh M, Edwards G. A 1-year prospective study of burns in an Irish paediatric burns unit. *Burns.* 1996;22(3):221-4.
- Ytterstad B, Sjøgaard A. The Harstad Injury Prevention Study: prevention of burns in small children by a community-based intervention. *Burns.* 1995;21(4):259-66.
- Sadeghi-Bazargani H, Mohammadi R. Epidemiology of burns in Iran during the last decade (2000–2010): review of literature and methodological considerations. *Burns.* 2012;38(3):319-29.
- Fernández-Morales E, Gálvez-Alcaraz L, Fernández-Crehuet-Navajas J, Gómez-Gracia E, Salinas-Martínez J. Epidemiology of burns in Málaga, Spain. *Burns.* 1997;23(4):323-32.
- Hemeda M, Maher A, Mabrouk A. Epidemiology of burns admitted to Ain Shams University burns unit, Cairo, Egypt. *Burns.* 2003;29(4):353-8.
- Coban YK, Erkiliç A, Analay H. Our 18-month experience at a new burn center in Gaziantep, Turkey. *Ulus Travma Acil Cerrahi Derg.* 2010;16(4):353-6.
- Haberal M, Uçar U, Bilgin N. Epidemiological survey of



- burns treated in Ankara, Turkey and desirable burn-prevention strategies. *Burns*. 1995;21(8):601-6.
19. Tang K, Jian L, Qin Z, Zhenjiang L, Gomez M, Beveridge M. Characteristics of burn patients at a major burn center in Shanghai. *Burns*. 2006;32(8):1037-43.
 20. Edlich R, Glasheen W, Attinger E, Anne A, Haynes B, Hiebert J. Epidemiology of serious burn injuries. *Surg Gynecol Obstet*. 1982;154(4):505-9.
 21. Libber SM, Stayton DJ. Childhood burns reconsidered: the child, the family, and the burn injury. *J Trauma*. 1984;24(3):245-52.
 22. El Sonbaty M, El Oteify M. Epidemiology of burns in Assiut Province, Egypt, during the last two years. *Ann Burns and Fire Disasters*. 1991;14:106-9.
 23. Jha SS. Burns mortality in Bombay. *Burns*. 1981;8(2):118-22.
 24. Adesunkanmi K, Oyelami O. The pattern and outcome of burn injuries at Wesley Guild Hospital, Ilesha, Nigeria: a review of 156 cases. *J Trop Med Hyg*. 1994;97(2):108-12.
 25. El-Muhtaseb H, Qaryoute S, Ragheb SA. Burn injuries in Jordan: a study of 338 cases. *Burns*. 1983;10(2):116-20.
 26. Khan A, Rawlins J, Shenton A, Sharpe D. The Bradford Burn Study: the epidemiology of burns presenting to an inner city emergency department. *Emerg Med J*. 2007;24(8):564-6.
 27. MacKay A, Halpern J, McLoughlin E, Locke J, Crawford JD. A comparison of age-specific burn injury rates in five Massachusetts communities. *Am J Public Health*. 1979;69(11):1146-50.
 28. Čelko AM, Grivna M, Dáňová J, Barss P. Severe childhood burns in the Czech Republic: risk factors and prevention. *Bull World Health Organ*. 2009;87(5):374-81.
 29. Tung K-Y, Chen M-L, Wang H-J, et al. A seven-year epidemiology study of 12,381 admitted burn patients in Taiwan—using the Internet registration system of the Childhood Burn Foundation. *Burns*. 2005;31(1):S12-S7.
 30. Lari AR, Alaghebandan R, Nikui R. Epidemiological study of 3341 burns patients during three years in Tehran, Iran. *Burns*. 2000;26(1):49-53.
 31. Quayle KS, Wick N, Gnauck KA, Schootman M, Jaffe DM. Description of Missouri children who suffer burn injuries. *Inj Prev*. 2000;6(4):255-8.
 32. Lundgren RS, Kramer CB, Rivara FP, et al. Influence of comorbidities and age on outcome following burn injury in older adults. *J Burn Care Res*. 2009;30(2):307-11.
 33. Pavoni V, Ganesello L, Paparella L, Buoninsegni LT, Barboni E. Original research Outcome predictors and quality of life of severe burn patients admitted to intensive care unit. *Medicine*. 2010;18:24-30.
 34. Vahdati SS, Moradi N, 4:191 GJ. Burn in North-West of Iran, Prevalence of Burning in East Azarbaijan. *Emerg Med*. 2014;4:191-7.

Archive of SID

