

Original Article

Pattern of burn injury at north of Jordan

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Abstract: To the best of our knowledge, pattern of burn injury was not reported yet at our region, our hospital considered the only tertiary referral center with the only burn unit at the region since 2001 till date, a retrospective analysis of our computerized filing system recorded 527 burn patients between 2001-2016, mean age was 26 years; 1.27:1 was the male to female ratio, 79 patients were found to have major burns, 46% of admissions were below 20 years' age, 92% was at domestic site of affection and 65% due to flame burn followed by scald burn in about 23%. The limbs were the most affected body site, majority of patients were below 15% TBSA and partial thickness, 77 patients found to have inhalational injury. Our mean hospital stay was 16 days and mortality was 8.2%. Mortality was associated with high TBSA affection, depth and flame type. This study shows the pattern of burn at north of Jordan, preventive measures by education and observation will reduce the incidence of burn and its sequel, non-flammable cook plates and stoves will probably help in decrease burn morbidity and mortality.

Keywords: Domestic flame burn, pattern of burns, induction cook plates and non-flammable stoves

Introduction

Burn, which locates among the most expensive of non-fatal injuries [1], is a common global problem [2], it has significant impact on community resources [3] and considered as the most common cause of accidental deaths worldwide, two million burns were reported in USA annually [4-7].

Burns also continue to be significant cause of morbidity and mortality especially in the low and middle income countries [6-13]. The sites of incidence are classified in to domestic, industrial or occupational, road traffic accidents (RTA), war injuries and criminal or suicidal attempts. It has been shown that domestic accidents form the main cause of burns in developing countries where industrial and RTA form the major causes in developed countries [1, 14, 15]. Understanding the pattern of burn injuries and etiopathological causes will help in prevention as well as decreasing its extent and morbidity.

In order to see the pattern and extent of this kind of problem, a retrospective study was performed by looking into the files of all patients

who were admitted to the burn unit at King Abdulla University Hospital (KAUH), Irbid Jordan. Mild cases of burn who will not need in-hospital treatment were managed by the primary hospital team. Patients needing admission to a burn unit were referred to KAUH for management. Our hospital is the main referral hospital of the north of Jordan. The inhabitants of Irbid province are about 1.5 million according to 2015 census.

Patients and methods

The record of all patients who were admitted to the burn unit during the years 2001 through 2016 were collected for the review.

Patients data were collected and the statistical package for the social sciences (SPSS) program was used to analyze the data.

Information regarding patient's demographics, cause, type, depth and extent of the burn was noted. The depth was graded as partial or full thickness skin burn; the extent was taken as the percentage of the body surface area (TBSA). Burns of 30% or more were considered as major [16]. The site of the body which was affected

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Table 1. Age to sex and mortality

	Total	Male	Female	Mortality
Age <10	125 (23.7%)	75	50	3 (2.4%)
11-20	119 (22.6%)	76	43	6 (5%)
21-30	88 (6.7%)	48	40	7 (8%)
31-40	87 (16.5%)	40	47	8 (9.2%)
>40	108 (20.5%)	56	52	19 (17.6%)
Total	527 (100%)	295	232	43 (8.2%)

was also recorded. The patients in-hospital stay, course and the outcome of the management was also recorded. The day timing of admission and season of the year was also looked so as to see if there were any variations.

Results

During the period January 2001 till December 2016. Five hundred twenty-seven patients were admitted, 295 patients were males (56%) and 232 were females (44%), (male:female ratio was 1.27:1), the age ranged from 1 to 98 years with the mean of 26 years (**Table 1**), 79 patients were admitted with major burns (15% of total admitted cases of which 41 patients were males and 33 patients were females, this was 15% of total admissions per gender too), with ratio of 1.24:1.

About half of the affected patients were below the age of 20 years (46.3%), of them 62% were males and 38% were females with a ratio of 1.63:1, this represents 50% of total male admissions and 40% of total female admissions.

Timing of admission was distributed evenly throughout the season of the year; this was the case in regard to gender as well. 218 patients were admitted in afternoon (41%), while morning and evening admissions were almost the same with 26% of total admissions per each; only 5% of patients were admitted after midnight.

Domestic environment was the most prominent site of incidence (92.5% of the total); of those 48% were males, 2.6% were affected at work, 1% was due to traffic accidents and about 4% was war affection; of those 68% were males, none of our cases was reported as suicidal attempt.

Flame burn was the cause in 65% followed by scald burn 23%, the ratio was 1:1, electrical

burn was 4.7%, chemical burn was 3.5%; of these 72% were males.

The limbs were the most affected body site with total of 283 patients (54%), male to female ratio was 1.14:1; of them 5% were reported as circumferential, 66 patients presented with head and neck affection (13%); the ratio was 1.82:1, about 10% reported with trunk burn; and the ratio was 1.5:1, while the others classified as mixed affection site. Limbs affection per gender was 55% of total male and 60% of total female admissions.

Three hundred twenty-eight patients were below 15% TBSA, while 118 patients presented with an extent between 15-30% TBSA, only 15% presented with major burns above 30% TBSA.

Superficial partial burns noticed in only 55 patients (10.6%), where most of our admissions were deep partial burns with a total of 372 patients (71%); male to female ratio was 1.2:1. Twenty percent of total female admissions were reported as full thickness burns comparing with 17% of total male admissions (**Table 2**).

Seventy-seven patients were found to have inhalational injury (15%); the ratio was 1.6:1, while our total intubations were 79 patients, escharotomy was needed in 24 patients, graft and flap was performed to 89 patients which represent 17% of total admission for each gender.

The mean stay of our patients at burn unit was 16 days, two thirds of each gender was admitted up to two weeks, male:female ratio was 1.37:1.

The total mortality was 8.2%, 23 patients were males and 20 patients were females. Nine out of 244 cases below the age of 20 years passed away, while 19 out of 108 above the age of 40 years passed away. 17 cases were died during the first 5 days of admission and 12 cases died during the second admission week. Only one patient deceased due to electric burn while the others were deceased due to flame burn at domestic site of affection. 53% of our mortality had mixed body site affection, 32% with reported limb affection. 81% of our mortality was with major burn with full thickness burn, all our mortality was reported to have inhalational injury and was on ventilator.

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Table 2. Variables to gender and mortality

		Male %	Female %	Total %	Mortality % of Total
TBSA	<15%	61.2	63.4	62.3	1.5
	15-30%	23.9	21.5	22.7	2.5
	>30%	14.9	15.1	15.0	44.3
Depth	Superficial	11.2	10	10.6	0.0
	Deep partial	72.1	69.9	71.0	2.4
	Full thickness	16.7	20.1	18.4	35.0
Cause of burn	Flame	62.9	67.8	65.4	12.2
	Hot Fluid	21.7	25	23.4	0.0
	Electrical	6.9	2.6	4.7	4.0
	Chemical	5.1	2.0	3.5	0.0
	War	3.4	2.6	3.0	0.0
Body site	Head/Neck	15.2	10.5	12.8	4.4
	Trunk	11.6	9.6	10.6	5.4
	Limbs	54.5	60.3	57.4	4.6
	Mixed	18.7	19.6	19.2	22.7
Site of incidence	Domestic	88.1	96.9	92.5	8.6
	Work	4.6	0.6	2.6	0.0
	Traffic	2.1	0.0	1.1	0.0
	War	5.2	2.5	3.8	5.0

Discussion

To best of our knowledge, this is the first epidemiological study of pattern of injury from Jordan, at our study male:female ratio which goes with the published data from neighboring countries and the world as well [4, 7, 17, 18], moreover childhood and adolescents constitutes the majority of admitted cases which is also in conformity with studies conducted at middle eastern countries, Komolafe et al from Malawi, Song & Chua from Singapore [3, 19-22] expressing the vulnerability of this age group at our region, however others report more frequency involvement in adults [7, 23, 24].

There was no significant winter predominance in regard to the season of affection though local gas heaters are frequently used during winter for living place heating, this was in contrast with Carroll et al [25] who reported summer is more frequent season, while Chien et al [26] and Dedovic et al [27] found spring is the most common. Most of our admissions were afternoon; the main kitchen time, this also in contrast with some published studies as well [25-27].

Domestic environment constitutes the most common site of incidence [28] as Mahaluxmivala

et al [3], Iqbal et al [7], Tarim et al [4], most of our kitchen's appliances are gas dependent like cooking plates and stoves; the ethanol gas still supported by government at our country, this supports the presence of flame at most if not all of our kitchens.

Flame burn was the commonest cause of burn at our region, this is in conformity again with published data [3, 4, 28-30] however scald burn was reported as the commonest among children by others [18, 21, 31, 32]. There were no suicidal attempts or self-inflicted burns were reported which goes again with Mahaluxmivala et al [3] but in contrast with Saadat et al [33], Groohi et al [34] and Maghsoudi et al [35]. Electrical burn was observed in only 5% of our study were due to low voltage electrical injury which was not the case in developed countries [24, 36].

Luckily, majority of our admissions presented with less than 15% TBSA which is in conformity of other studies [7, 18, 21, 22]. Our mortality was 8.2% comparing to Iqbal et al [7] 14%, Haik et al [37] 4.4%, Mahaluxmivala et al [3] 5.6%, while might reach up to 37.6% in other studies [38]. Most of our mortality is of domestic affection. Children below 10 years carry the lowest risk of mortality, this was in contrast with Anlati et al [38], there was no significant difference noted in term of mortality regarding the gender for all age groups which was in contrast with Anlati et al [38] too.

Domestic flame burn was responsible for almost all our deceased patients except one patients who pass away due to electrical burn injury, as flame burn affects not only large body surface area but also susceptibility for inhalational injury, which goes with several published data [3, 7, 38, 39], most our mortality was reported as mixed body site affection with full thickness burns and more than 30% body surface area which in conformity with several published data [3, 7, 16, 38, 40] too.

Our mean hospitalization stay was 16 days comparing to Saffle et al [41] from USA was 13.5 days, Mahaluxmivala et al [3] from KSA was 16.4 and Bang and Ghoneim [16] from Kuwait was 38 days.

Conclusion

Acknowledging that preventive measures at domestic property beside paternal and maternal education and supervision will help to decrease the risk of burn and its sequel, moreover the new era in kitchen appliances like Induction cook plates and non-flammable stoves will probably help in burn morbidity and mortality.

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Disclosure of conflict of interest

None.

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