Original Article

Burns

Epidemiology and Mortality of Burns in Karachi

1. Imran Afzal 2. Romela Naz 3. Muhammad Khurram Afzal

1. Assoc. Prof. of Forensic Medicine, JM&DC, Karachi, 2. Asstt. Prof of Forensic Medicine, Sir Syed College of Medical Sciences, Karachi, 3. Demonstrator Forensic Medicine, JM&DC Karachi

ABSTRACT

Objective: Despite being a serious hazard the causal factors and outcomes of burn injuries in Karachi remain an under researched area. The purpose of our study was to analyse the epidemiology and mortality of burn injury cases in Karachi in order to create awareness at mass level.

Study Design: Prospective Observational Study.

Place and Duration of Study: This study was carried out from October 30th, 2013 to April 30th, 2014 in the Burns Centre, Civil Hospital Karachi.

Materials and Methods: The study encompassed all the burn injury cases (expired or alive) reported to the Civil Hospital during the six months of the study period. The demographic information, cause and level of injury of all the reported cases were documented.

Results: 784 cases of thermal injuries were reported. Out of these, 441(56.25%) were males and 343(43.75%) were females. Most of the burn victims (60%) belonged to the age group of 15 – 44 years. Out of 784 cases, 565 cases (72%) were of serious dermo-epidermal and deep burns. The overall burn mortality rate was found to be 55.9%. This included burn victims who were brought dead or expired during treatment. Maximum burns were a result of fire/flame (48.1%).

Conclusions: The mortality rate of burn injuries in Karachi is alarming as compared to the international statistics. Fire incidents are the main cause of these injuries. Fatal burns can be prevented if necessary precautions are taken.

Key Words: Burns, thermal injury, epidemiology, mortality, Karachi.

INTRODUCTION

Burns are abysmal and agonizing injuries that either result in fatality or inflict lifetime physical, emotional[1]& psychological wounds to the survivors and their families. In comparison to other treatments, burn injury treatment requires a lot more resources[2] making it a key economic burden. Burn injury is undeniably a serious public health concern around the globe. Karachi is one of the largest and densely populated cities of Pakistan. Numerous cases of thermal injuries and burns are reported here on daily basis. In the last decade, there has been a rising trend in burn injury patients. In order to control and prevent these injuries, a thorough understanding of burns and their epidemiology is needed.

Burn or thermal injury is characterized as damage to the tissue caused by exposure of inner or outer body surfaces to heat leading to capillary impairment, fluid exudation, necrosis of injured tissue and trauma[3]. These injuriesinclude simple burns, scalds, chemical burns[4], electric burns and radiation burns. Thermal injuries can have varied impacts ranging from minor to major depending upon the temperature & time period of exposure, degree & location of burns, and patient age[3]. The effects of burns are classified into discrete zones namely coagulation, stasis, and hyperaemia[5].For evaluation of burn severity level, burns are categorized into different classes (Table No. 1).

Size of the burn in adults is typically evaluated by assessing percentage of patient's body area having burns of partial and full thickness[10]. For this purpose *rule of nines* is used. "9% is for head and each arm, 18% for front or back of trunk, 9% for front or back of each leg, and 1% for perineum thus making a total of 100%."[3] Thermal injuries that cover more than 20% of TBSA (total body surface area) are termed as major burns[11].

Thermal injuries are one of the most complicated and challenging injuries. A moderate burn can turn into a fatal injury due to negligence. Infection is considered to be the greatest challenge in burn treatment.[12] Skin, acting as a natural barrier against micro-organisms colonization gets damaged giving an open entry to various infections and sepsis[13] thus posing a high risk of infections in patients with burn injuries.[14, 15] This further results in increased complications[16] especially among children.[17] Some studies have found infections[18] and sepsis[19]as the most prevalent causes of mortality in burn injury patients.

All the burns cases are medicolegal cases. Despite being a serious hazard the causal factors and outcomes of burn injuries in Karachi remain an under researched area. The purpose of our study was to analyse the epidemiology and mortality of burn injury cases in Karachi in order to create awareness at mass level.

Table No. 1: Classification of Burns

Categories of Burns	Degree of Burns	Description of Burns	Appearance of Burns	Healing Time	Result
Epidermal	First- degree (Superficial) burns	Only involves epidermis. Very painful	Red and dry. Typically a blister is formed.	Self-healing. 5-10 days	No Scar
Dermo-epidermal	Superficial Second-degree (Superficial Partial Thickness) burns	Involves epidermis and portion of underlying dermis. Painful	Wet, erythematous skin. Clear blisters. Blanch if touched.	2 weeks	Usually no scar
	Deep Second-degree (Deep Partial Thickness) burns	Involves reticular dermis. Painful	White blisters. Do not blanch	Minimum 3 weeks	Scar often contracts resulting in deformity and function impairment
Deep	Third- degree (Full Thickness) burns	Severe damage to all skin layers. Nerve endings get damaged. Burns are fairly painless.	Dark brown, grey or black with a leathery texture		Mostly need skin grafting. May result in contractures and function loss.
	Fourth- degree burns	Completely burnt skin layers. Affects muscles, tendons & bones. Painless burns			

MATERIALS AND METHODS

This prospective observational study was performed in the Burns Centre, Civil Hospital Karachi (CHK). It is a public sector hospital and one of the leading burn units of the country. The Burns Centre CHK offers 24/7 emergency on call Burn Care service. This study was performed during a period of six months starting from October 30th, 2013 to April 30th, 2014.

In this study, all the thermal injury cases brought to the hospital (expired or alive) were included. 784 cases of burns were reported during our study period. Their demographic data, cause and degree of burns and the final outcomes after treatment were recorded. To conduct this study, formal approval was taken from the hospital authorities. Patients or their relatives were also taken into confidence and were ensured that confidentiality of their personal information will be maintained.

RESULTS

Our findings showed that out of a sample of 784 cases, males were 441 (56.25%) and females were 343 (43.75%) (Fig. No. 1 & Table No. 2). For convenience, the patients were divided into four age groups.

Majority of the burn cases (60%) were reported among the age group 15-44 years, 18.4% were among age group of 0-14 years, 125 cases (16%) belonged to the age group 45-64 years while 44 (5.6%) were from the age group > 65 as shown in Fig. No.2 & Table No. 2.

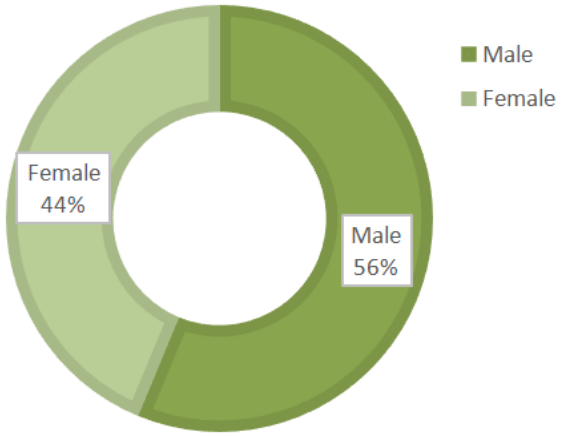

Figure No.1: Burn Injuries on Gender basis

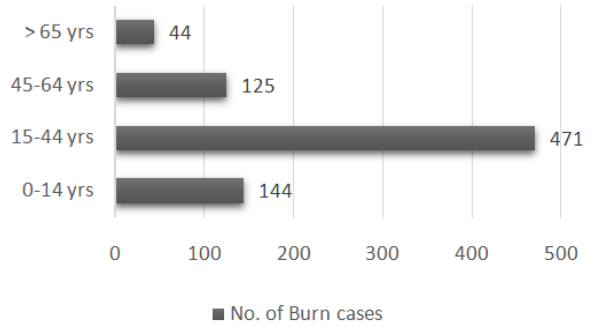

Figure No. 2: Age distribution of Burn Cases

Table No. 2: Distribution of Burn cases according to demographic factors (N=784)

Sr. No	Factors		No. of Reported Cases	%age
1.	Gender	Male	441	56.25
		Female	343	43.75
2.	Age	0-14 yrs	144	18.40
		15-44 yrs	471	60.00
		45-64 yrs	125	16.00
		>65 yrs	44	5.60

The burns categorisation on basis of depth showed that 14% had epidermal burns, the burns which are minor & get healed if protected from infection, 47% had dermo-epidermal burns, which varied from moderate to serious burns and 39% had deep burns (Table No. 3).

Table No. 3: Distribution According to Classes of Burns

Sr. No	Categories of Burns	No. of Cases	%age
1.	Epidermal Burns	110	14
2.	Dermo-epidermal Burns	368	47
3.	Deep Burns	306	39
	Total	784	100

The distribution of thermal injury cases according to the %age of burnt total body surface area (TBSA) is shown in Fig. No.3. In 160 cases burnt surface area ranged from 0-10 %, in 105 patients 11-20 %. Majority of the burn cases had 41-60% of burnt TBSA.

Investigation regarding causes of burns revealed that 48.1% of the burn injuries were a result of fire or flame. 33% of injuries were caused be hot liquids. 75 patients (9.6%) got burns from exposure to chemicals and burns in 73 cases (9.3%) were caused by different means including electric shock, radiations etc. (Table No. 4)

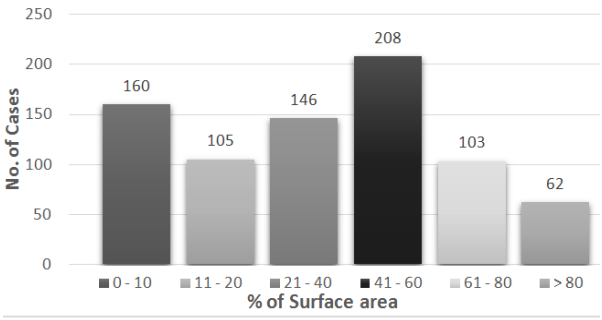

Figure No.3: Distribution of Burns according to TBSA

Table No. 4: Distribution of Causes of Burn Injuries

Sr. No	Causes of Burns	No. of Cases	%age
1.	Fire/ flame	377	48.10
2.	Hot liquids	259	33.00
3.	Chemicals	75	9.60
4.	Others	73	9.30
	Total	784	100.00

The mortality rate of burns in Karachi was 55.9% where 15.2% (n= 119) of the victims expired before they could reach the hospital while 40.7% (n= 319) of the burn victims died during or after the treatment (Table No. 5).

Table No. 5: Mortality & Survival rate in Burn Injuries (N= 784)

Sr. No			No. of cases	%age
1.	Alive		346	44.1
2.	Dead	Brought dead	119	15.2
		Expired during/after treatment	319	40.7
Total			784	100.00

After documenting the results, they were closely analysed and their relation with the mortality rate was determined. Table No. 6 shows that death rate was significantly higher among female victims (70%) as compared to males. Age group of 15 – 44 years experienced majority of deaths (68%) from burn injuries while deep burns proved to be most fatal with a rate of 86%. Victims with 81% or more burnt TBSA had no chance of survival. Most of the deaths occurred from fire (69%).

Table No. 6: Findings & their relation with Burn Mortality

Sr. No	No. of Cases	Alive	Dead	Total
		346	438	784
1.	**Gender**			
	Male	243(55%)	198 (45%)	441
	Female	103(30%)	240 (70%)	343
2.	**Age (years)**			
	0 – 14	90(42.5%)	54 (37.5%)	144
	15 – 44	149(32%)	322 (68%)	471
	45 – 64	84(67%)	41 (33%)	125
	> 65	23(52%)	21 (48%)	44
3.	**Classes of Burns**			
	Epidermal	103(93.6%)	7 (6.4%)	110
	Dermo-epidermal	201(55%)	167 (45%)	368
	Deep	42(14%)	264 (86%)	306
4.	**%age of TBSA**			
	0 – 10	141(88%)	19 (12%)	160
	11 – 20	78(74%)	27 (26%)	105
	21 – 40	86(59%)	60 (41%)	146
	41 – 60	37(18%)	171 (82%)	208
	61 – 80	4(4%)	99 (96%)	103
	> 81	-	62 (100%)	62
4.	**Causes of Burns**			
	Fire/flame	118(31%)	259 (69%)	377
	Hot Liquids	123(47.5%)	136 (52.5%)	259
	Chemicals	52(69.4%)	23 (30.6%)	75
	Others	53(73%)	20 (27%)	73

DISCUSSION

The results of this study show that ratio of male burn victims was relatively same as that of female victims. This is because both males & females are equally vulnerable to thermal injuries inside their homes as well as in the outer world. Fire eruption in houses, markets, factories, warehouses, trains, road accidents, explosions in vehicles, acts of violence, rivalry, etc are common causes of thermal injuries. Fire was found to be the main cause of thermal injuries. This finding is consistent with other studies[20, 21]. Burns from firecrackers and handling of firework and other explosive materials[22] is a problematic issue being very common in Pakistan. Second most common cause of burn injuries is hot liquids. Scalding from hot liquids can be fatal[23]. It is a common health hazard in every house. In most cases, children become victim to these burns in kitchens during meal preparation. Chemicals were also identified as one of the factors causing burns. In addition to people being exposed to chemicals at work stations and factories[24], females in Karachi often become a victim of acid attack in public. This mostly happens as a result of family rivalry or other social factors. Acid is commonly thrown on face of the victim. Injuries from these chemical attacks cause damage to a great extent and in majority of cases the skin becomes irreparable.

The mortality rate associated with burn victims in Karachi was also assessed and was found to be 55.9%. Different researches suggest that throughout the world, thermal injuries contribute to approximately 5% of overall mortality[25]. A study from Pakistan shows a mortality rate of 29.7% in burn cases[26]. Considering these rates, the result of our study is alarmingly high. There can be multiple reasons behind the high mortality rates. It is important to keep in mind that mortality in burn patients depends on multiple factors including cause of burn, TBSA, degree of burn and health care facilities[19]In the past year, Karachi has seen a lot of fire accidents affecting people at mass level, especially in factories, trains, and houses. The incidences of fire increase in winter season due to sheer negligence of people. Load shedding of sui gas is done in winter season all across Pakistan including Karachi. During load shedding or low pressure of sui gas, people forget to check their gas ovens and stoves. Hence leakage of gas occurs resulting in fire explosion. Other than gas stoves, use of kerosene stoves[27] can be fatal resulting in severe burn injuries. Use of these stoves is very common among the lower socio-economic classes of Karachi. Young girls are found to be the prime victims of third and fourth degree burns from these explosions.

Faulty wiring and short circuiting is another common cause of fire in markets and homes. Excessive use of inferior quality CNG cylinders in automobiles pose a massive hazard to the society. These vehicles tend to catch fire quickly endangering the lives of passengers as well as the nearby pedestrians. Burn injuries in all these accidents are mostly fatal involving deep and wide area burns.Mass level fires in slums of Karachi is

also a major contributing factor towards the mortality rate.

An important aspect of this study was to relate the findings with the burn injury mortality rate and identify the most susceptible areas and segments of the society. It was found that the mortality rate of females in thermal injury patients was higher than that of males. There are several socio-economic reasons behind this finding. Some of the common reasons have already been discussed. Moreover, suicidal burning and homicidal burning are two key factors behind high female mortality from burn injuries. Because of innumerable factors, women commit suicide by setting themselves on fire. Women also become a victim of domestic violence followed bythermal injuries[28] that can be fatal.Homicidal burning of women is also very common in Karachi but unfortunately the cases remain unreported as these incidents are regarded as domestic accidents resulting from stove explosions.

CONCLUSION

Burn injuries are very traumatic and have long-term adverse effects on the victim's life. These injuries are excruciating followed by a costly treatment. Unfortunately, burn injuries are common in Karachi with a high mortality rate. These injuries can be fatal. Treatment of these injuries require a lot of time, care and expertise. Measures need to be taken to curtail incidences resulting in thermal injuries. It has been observed that the mortalNility rate of thermal injuries can be lowered by adopting preventive measures. Despite being deadly, burn injuries are preventable. This study attempts to create awareness among the masses regarding the seriousness of burn injuries and the common causal factors associated with them. Concerned authorities should also take measures and enhance the quality of health and safety facilities provided to the people.

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Address for Corresponding Author:
Dr. Muhammad Imran Afzal
Associate Professor and HOD Forensic Medicine,
Jinnah Medical and Dental College, Karachi.
Residence Address:
House No. 46 ,17th street Khayaban-e-Mujahid
Phase 5. DHA, Karachi.
Phone: Res: 021-35856666, 021-35857777,
Cell No.: 0300-8297876