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TREND OF BURN INJURIES IN HOSPITALIZED PATIENTS AND ITS OUTCOME

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ABSTRACT

Objective: Morbidity and mortality as a result of burn injuries is still a major concern for the health care provider; therefore this study is conducted to identify the socio-demographic factors associated with it and then developing comprehensive treatment methodology and safety measures.

Patients and Methods: A total of 500 patients admitted during the period from September 2009 to March 2010 in a burn unit of tertiary care hospital of Karachi were included and their data collected on a Performa regarding age & gender, marital status, etiology, manner & type of burn, percentage of body surface area burnt, and clinical outcome.

Results: Out of 500 burn victim, 51.8% were female. 56% were married. Mean age of patients was 26.38 ± 14.23 years. Young adults of group 2 & 3 comprised 58% of the total population studied. Most common manner was accidental (83%) followed by suicidal (11.8%) and homicidal (5.2%).Flame was the leading cause of burn injuries (63.8%) followed by scald (13.8%) . Chemical, electrical and flash burn represented 10.8%, 8.2% and 3.4% of the burn victims respectively. Overall mortality was 37.2%. Mortality was significantly associated with TBSA ($p<0.000$), age ($p<0.001$), and marital status (0.0006) when two groups of each one were compared.

Conclusion: Health care provider needs deep study to identify factors associated with fatal outcome and then formulating a program to implement preventive and safety measures as well as developing strategies to make the treatment effective to reduce the mortality.

Key words: Burn injuries, outcome, suicidal, homicidal

INTRODUCTION:

Recently injuries emerged as one of the most important public health hazards in both developed and developing countries of the world. WHO' s international classification of diseases version 10 (ICD-10) classifies burn injuries by the site of injury in chapter XIX as " burns and corrosions" (T20 – T32) and in terms of etiology as those caused by exposure to smoke, fire and flames(X00 – X09), contact with heat and hot substances(X10 – X19), exposure to electric current(W85-87), lightening(X33) and exposure to corrosive substances (X46, X49). Therefore burn covers scald as well as injuries caused by heat from electrical heating appliances, electricity, flame, friction, hot air & gases, hot objects, lightening and chemical burns. [1]A burn is a thermal injury to the skin caused by heat, electricity, chemicals, light, radiation or friction. The nature of injury, patients and treatment available all influence the resultant outcome of burn. The prognosis of burn depends upon the surface area burnt (%TBSA) and age of patient. Rule of Nine is applied as an effective method to estimate total burnt surface area (TBSA). Lund & Browder charts accurately measure burnt area using the different proportions of body parts in adults and children.[2]

Burns and scalds constitute 5 – 12% of all traumas and a common problem presented to the health professionals working in hospital.[3] In Pakistan exact statistical figures are not available.[4] In United States 5,500 deaths were caused by burn in 1991.[5] India shows that 700,000 patients per year are admitted due to burn but few of them receive attention in specialized burn unit.[6] Approximately 90% cases of burn occur in developing world out of which 70% involve children. Person with the burn injuries greater than 40% TBSA seldom survive in developing world.[7]

The incidence of burn takes place most commonly at home because of cooking, availability of inflammable materials, life style, social factors and ideal site for committing suicide.[4, 8, 9]

Accidental scalds among the children are frequent occurrence at home.[10] Peoples affected by burn mostly belong to poor socio-economic status, children and young age. The WHO estimates that 310,000 peoples died from fire in 2004 across the world, the great majority being in low income and middle income countries with a global mortality rate amounting to 4.8 per 100,000 per year which means that 29000 deaths occurred in the East Mediterranean Region (EMR) with a mortality rate of 5.6 deaths per 100,000.[11]

Burn injuries still remains a major health problem in the subcontinent and requires intensive research study to highlight the problem and planning prevention strategies, developing better treatment modalities and training of health professionals.

MATERIAL AND METHODS:

This descriptive study was carried out in burn unit of teaching hospital of Karachi on 500 cases admitted during September 2009 to March 2010. Case record of all burn patients who admitted during this period was scrutinized. Patient's data was collected on a Performa including age & gender, marital status, etiology, type of burn, percentage of body surface area burnt, manner of burn and clinical outcome. Percentage of burn was determined by using 'Rule of nine' in adults and 'Lund and Browder charts which take into account the different proportions of body parts in children. Patients who received emergency treatment for minor and superficial burn were excluded from the study.

Data was entered in a Microsoft Excel spreadsheet and analyzed using SPSS version 13and Chi-square test was used to calculate the p value for comparison of two groups.

RESULTS:

Out of total 500, 259 (51.8%) were female and 280 (56%) were unmarried. Age of patient ranged from 18 months to 80 years with a mean of 26.38 ± 14.234 years. Majority of the studied population (58.8%) belong to age group 16 – 35 years (Group 2 & 3) while children less than 15 years of age constituted the 3rd largest group (18.8%) of burn victims.

Female's preponderance was noticed in age group 2 and then later part of life. Majority of the burn victim caught fire at home. Most common manner of burn was accidental (83%) followed by

TABLE I:
MANNER OF BURN

	Accidental		Suicidal		Homicidal		TOTAL
Age group	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	
Group 1(1 - 15 yrs)	43	42	4	3	1	1	94
Group 2(16 - 25 yrs)	61	85	17	20	8	5	196
Group3 (26 - 35 Yrs)	40	41	6	4	6	1	98
Group 4(36 -45 yrs)	30	33	1	2	4	0	70
Group 5(46 - 55 yrs)	14	7	0	1	0	0	22
Group 6 (56 - 65 yrs)	4	9	0	1	0	0	14
Group 7 (>66)	2	4	0	0	0	0	6
TOTAL	194	221	28	31	19	7	500

TABLE II
TYPES OF BURN

	Fire Burn		Scald Burn		Chemical Burn		Electric Burn		Flash Burn		TOTAL
Age group	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	
Group 1	19	20	13	16	6	7	8	2	2	1	94
Group 2	53	82	7	14	15	12	8	2	3	0	196
Group 3	31	37	1	6	4	2	10	1	6	0	98
Group 4	24	24	3	6	2	4	3	1	3	0	70
Group 5	5	8	0	2	1	1	3	1	1	0	22
Group 6	2	9	0	0	1	0	1	1	0	0	14
Group 7	0	4	1	0	0	0	0	0	1	0	6
TOTAL	134	184	25	44	29	26	33	8	16	1	500

TABLE III
RELATIONSHIP OF PERCENTAGE OF BURN WITH OUTCOME

%AGE OF BURN	OUTCOME			TOTAL	%AGE
	D /C	EXPIRED	LAMA		
Less than 10%	95	02	06	103	20.6
11 – 20 %	90	06	15	111	22.2
21 – 30 %	40	16	12	68	13.6
31 – 40 %	18	20	05	43	8.6
41 – 50 %	09	31	03	43	8.6
51 – 60 %	07	31	03	41	8.2
61 – 70 %	05	26	01	32	6.4
> 70 %	04	54	01	59	11.8
TOTAL	268	186	46	500	100%

TABLE IV

RELATIONSHIP OF TBSA AND MORTALITY				
%AGE OF BURN	TOTAL	PATIENTS EXPIRED	PATIENTS SURVIVED	p - value
? 30	249	24	225	< O.OOO
> 30	205	162	43	
RELATIONSHIP OF AGE WITH MORTALITY				
AGE	TOTAL	EXPIRED	SURVIVED	p-Value
? 30	357	118	235	0.001
> 30	143	68	75	
RELATIONSHIP OF SEX WITH MORTALITY				
SEX	TOTAL	EXPIRED	SURVIVED	P - Value
MALE	241	86	155	0.114
FEMALE	259	106	153	
RELATIONSHIP OF MARITAL STATUS WITH MORTALITY				
MARITAL STATUS	TOTAL	EXPIRED	SURVIVED	p - value
MARRIED	220	99	121	0.0006
UNMARRIED	280	87	193	

suicidal (11.8%) and homicidal (5.2%). Accidental burn injury was prevalent among the female while homicidal burn among the male victims. Highest frequency of burn cases were noticed in age group 2 in all manner of death. Children less then 15 years formed 2nd largest group in accidental burn. (Table - I)
Flame or fire burn represented the major cause of injuries (63.8%). Scald was the second leading cause of burn injuries accounting for about 13.8% burn victims. The occurrence of chemical, electric and flash burn were 10.8%, 8.2% and 3.4% respectively.
While considering gender distribution 57.6%, 10.3%, 11.6%, 13.7% and 6.6% male and 69.49%, 16.98%, 10%, 3%, and 0.3% female suffered from flame, scald, chemical, electric and flash burn respectively. Flame and scald burn showed a more preponderance towards the female involvement representing burn in domestic set up. While chemical, electrical and flash burn showed a tendency to affect male more, representing the occupational and street exposure. Flame burn affected persons of age group 2 (16 -25 years) while scald affected the victim of age group 1 (1 – 15 years) i.e. mainly children. (Table II)
Table III represent the patients with Total Burn Surface (TBSA) and their outcome in terms of discharge, death and leave against the medical advice (LAMA). 186 patients (37.2%) with any kind of TBSA, expired due to different reasons which could not be found out on screening of record. 132 patients (26.2%) had more than 50% TBSA, out of which 111 expired with a mortality rate of 84.09%. 214 patients had burn less than 20%, out of which only 08 patients expired with a mortality rate of 3.7%. 154 patients suffered from burn with TBSA between 21 – 50%, out of which 67 patients expired with a mortality rate of 43.50%.This figures reflect a strong correlation with the increasing TBSA and death. Out of 500 patients 268 cases (53.6%) treated successfully with daily washes, debridement and dressing using local 1% silver sulphadiazine cream and ultimately discharged. 46 patients (9.2%) left the hospital without any medical advice (LAMA).
Mortality was significantly associated with TBSA ($p<0.000$), age ($p<0.001$), and marital status (0.0006). (Table IV)

DISCUSSION:

A better way to improve the prevention as well as treatment is to find the gaps present in the management of the condition which in turn requires a good understanding of epidemiological factors and clinical details. In developing countries like Pakistan injuries constitute the major public health concern. Burn injuries represents one of the leading causes of morbidity and mortality in the low and middle income countries particularly Pakistan.[12] In present study 500 burn cases, admitted to the burn unit of a tertiary care hospital in Karachi over a period of 6 months from September, 2009 to March, 2010 were scrutinized. Our study shows higher incidence of burn injuries among the females which is in accordance with the study conducted in Pakistan before.[13] Systemic review of publications on burn in East Mediterranean Region by Nasih Othman and Denise Kerdrick[14], revealed that in Iran a higher proportion of females suffer burns compared to males when all ages are included. Some studies have revealed contrasting results.[15, 16] Female are at greater risk of burn because they are involved in preparing and serving meals at home.

Our study shows that burns occur in all age groups ranging from 18months to 80 years with a mean of 26.38 + 14.234 years. This is very close to the study conducted in India[17] which shows patient age ranging from 1 to 60years with a mean 23.95 + 16.7 years.

This study shows that out of total burn victims 72.8% were in age group 16-45years and 8.4% over 45 years. Children less than 15years of age formed 1/5th of the total sample studied. Closer results have been shown by the study carried out in Alexandria, Egypt with 1/5th of the burn victims being children of 0-5years; half of the cases were aged 10-40years while those aged 50years and over represented 6.7% of the cases.[18] One of the Indian study[17] has indicated that more than half of the cases were aged between 21-40years, while those aged 40years and above represented 10.2% respectively.

This pattern suggests certain life style, behavior of individual and age group predisposition to burn. Searching, suspicious nature and lack of knowledge of danger, play some role in burn injury of children while the young adults are burnt because they are in the active part of life to tackle all situations both at home as well as work. Elderly persons are at non active part of life, therefore not much exposed to the hazardous situations.

Female preponderance in the age group 2 and later part of life coincides well with the other studies done in developing countries. Few victims are seen above the age of 56 years, while the largest populations of the burn victim are in the age group 16-25years, a finding similar to the study done in India and Jordan.[19, 20] Females of this age in our country get married and involved in kitchen activities, thereby predisposed to the burn injury.

Male preponderance in age group 1-15 years coincides well with study from various countries[19, 21] and explained by the fact that the boys have exploring and uncooperative nature. Our finding that males in age group 3 & 5 suffered burn injuries more than the females is in agreement with the study of an industrialized country.[22]This is explained by professional responsibility, industrial accidents, unemployment and stressful environment among males. We found accidental burns 83% while the suicidal and homicidal burns accounted for 11.8% and 5.2% respectively. Studies from Alexandria Egypt[18, 23] have reported 85% and 89.1% accidental burns injuries respectively. Suicidal burn (11.8%) in our study is very close to the study done in Jordan (13.5%) [24] but higher when compared with the study done in Alexandria Egypt.[18] Our study represented 5.2% homicidal burn which is contrary to the earlier study done in Pakistan and India showing 12.9% and 21.6% homicidal burns respectively[13, 25] but closer to the study carried out in Alexandria Egypt.[18]

Present study shows flame as most common agent affecting 63.8% of the burn victims closer to the study conducted in Indore India.[17] Study from Alexandria, Egypt[18] has reported 66.8% flame burn. Flame was followed by scald burn with the more vulnerable age group 1-15 years. Scald affected 13.8% of the burned population in our study. This result is in agreement with most of the studies done previously.[17, 18, 23]

Chemical burn in our study was found to be 10.8% of the total burn victims which is higher than the study done previously.[26, 27] 13% contact burn has been reported in a study from Shiraz, South Iran. [28]

Electrical burn represented 8.2% of the burn victims in this study, coinciding well with the study done in King Fahd Hospital; Al Baha.[27] Another study from Peshawar Pakistan reported 10.8% of electrical burn injuries.

Burn injuries account for significant mortality. In the present study mortality was 37.2% with any kind of TBSA, closer to the study done in Alexandria, Egypt.[18] A high mortality in our study may be due to deficiency of fully equipped burn units and trained staff for the emergency management of burn victims. Hygienic conditions of our country also influence the outcome. Our study shows 84 % mortality in burn victims having more than 50% TBSA similar to the study done in Western Azerbaijan, Iran.[29] Our study also shows significant association of mortality with TBSA, age and marital status when two groups of each factor were compared. A high mortality associated with increasing TBSA has been shown by most of the previous studies.[26, 18, 29] Group of young age patients formed the largest population of burn victims in our study and death occurred more commonly in burn patients less than 30 years of age. This is in accordance with other studies.[8, 26] This is the period of life when youngsters are wed locked, and as a result of non adjustment, new environment, responsibilities and domestic accidents, suffer burn injury.[8, 26]

CONCLUSION:

Burn injury is still a major challenge for health professional requiring intensive investigation to identify the factors associated with fatal outcome. This study has shown that young adults and children being main victim suffered from flame burn and scald as a result of domestic accidents. We need to implement an educational program to increase the awareness regarding the risk factors and dangers associated with burn. We also need to implement preventive and safety measures at home and workplace. Improvement in the management of burn victims in a well equipped burn centers also demanding the construction of specialized burn units to reduce the morbidity and mortality.

AUTHOR CONTRIBUTION:

All authors participated in the design of the study, data analysis and preparation of manuscript. Dr. Syed Zubair Ahmed Tirmizi and Dr. Asha Mahesh conceived the idea, prepared Performa for data collection, analyzed and interpreted the data. Dr. Syed Zubair Ahmed Tirmizi did extensive literature search, reviewed the manuscript, and retrieved the relevant references as well. He finally developed and wrote the main manuscript of the article.

Sana Yaseen, Paras Mangi, Sahirah Waseem collected the data and participated in data analysis and writing initial draft of the article.

All authors saw and approved the final version of the article.

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