Epidemiology of Burned Patients Admitted In Burn Unit of A Rural Tertiary Teaching Hospital

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Abstract

Epidemiological study on burn injuries and exploration of the risk factors in different regions is important for effective intervention. Very little is known about burn injuries in Wardha district of Maharastra. ***Aims and objectives;*** *To determine epidemiological, clinical variables and common risk factors in patients of burn injuries.* ***Material and methods;*** *Retrospective & prospective study was carried out on a total of (n=714) burn patients admitted in the Department of Surgery at Mahatma Gandhi Institute of Medical Sciences, Sevagram between 1st April 1999 to 31st March 2003 This descriptive study reflects epidemiological data & clinical assessment of burn patients.* ***Observation;*** *The 21-40 yrs age groups had 53.5% of total patients. Female out numbered males in all age group (F:M = 1.77:1). In our study 70.31% of the patients belonged to low socioeconomic status, while 62.32% patients were illiterate. A total 67.07% patient was married and in both groups, percentage of married females was more. 44.12% patients were housewives, 92.58% of burn injury was accidental. Flame burn constituted 87.82% cases. Burn case mortality rate was 46.36%. Septicaemia 42.21% was most common modality of death.* ***Conclusion;*** *High-risk groups and risk factors for burn are age 21-40 yrs, married female, housewives, low socio-economic status, illiteracy, flame burn mostly due to open fire cooking, accidental nature. So measures should be taken to provide proper education to prevent these accidents and ensure safety.*

Key words: *Burns, Clinical features, Risk factors.*

Introduction

Fire has served as well destroyed mankind.[1] Burn represents an extremely stressful experience for both the burn victims as well as their families. Patients who suffer from extensive burn injuries frequently die, while others suffer from long hospitalization, multiple surgeries, and prolonged rehabilitations. Prevalence of burn in India is reflected in studies from different parts of country.[2, 3] Burden of this disease causes severe pressures on financial and manpower resources. Epidemiological studies have an important role in recognition of risk factors and high-risk groups.[4] Hence the present study was undertaken in a burn unit to determine epidemiological, clinical variables and common risk factors in patients of burn injuries.

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Material and Methods

After obtaining Institutional Ethics Committee approval, retrospective & prospective study was carried out on a total (n=714) of burn patients admitted in the Department of Surgery at Mahatma Gandhi Institute of Medical Sciences, Sevagram between 1st April 1999 to 31st March 2003. The patients admitted between1st April 1999 to 31st March 2001 were included in retrospective group-A (n=381) while the patients admitted between 1st April 2001 to 31st March 2003 were included in prospective group-B (n=333). Patient not willing (written informed consent taken) were excluded. The data regarding (i) registration: age, sex, residence, education, occupation, marital status, socio-economic status, (ii) circumstances of the injury: place, time, agent and (iii) chronological data: dates of admission and discharge were obtained by questionnaire-interview either with the patient themselves or patient's attendants. Clinical assessment was done in the form of general condition, TBSA (total

body surface area), degree/depth and associated illness. Depth of burns was divided into first, second and third-degree burns. For defining the extent of burns we used Wallace's rule of nine in adult and Lund&Browder chart in paediatrics age.[5] Investigations which included haemogram, serum electrolytes, urea, creatinine, random bloodsugar, urine albumin, urine sugar, wound swab culture & sensitivity were done on admission and when required. The interrelationship between clinical variables and epidemiological variables with burn injury were studied. This was descriptive study so no significant test was applied. On the basis of analysis and observation, results were drawn and discussed and compared with other relevant literatures.

Observation

Socio-demographic characteristic: During the 4 years study period, total (n= 714) patients (258 males and 456 females) were admitted to our hospital with burn injuries. The incidence of burn was 714/84148 (0.84%) of total hospital admissions and 714/19536 (3.65%) of total surgical admissions per year. As in Table 1, majority 53.5% of the patients were in 21-40 yrs age group followed by 33.05% in d"20 yrs age group. Female out numbered males in all age group (F:M = 1.77:1). Most patients73.1% lived in rural area. Occupation wise-House wife 44.12%, labours 21.71%, business 5.18%, job 1.12%, students 14.98% and according to Socio-economic status-Low 70.31%, middle 20.16% and high 9.53% were type of distribution. Education status revealed Illiterate 62.32%, primary 21.15%, secondary 12.75% and higher-secondary 3.78%.Marital-status revealed married male 21%, married female 46.07% and unmarried 32.92%.

From Table 2**,** it is evident that most 48.59% of burn injury occurred during early part of day time followed by 29.13% during evening. Accidental injury commonly occurred during early part of day, suicidal injury occurs during evening hours and homicidal injury occurs during early part of night. Female had (2.6 times) more burn than male in early part of night.

From Table 3, it is evident that 98.46% injury occurred at home but 1.54% out side. Flame burn 87.81%, scalds 10.08%, electrical burns 2.11% were types of burn. There were none of patients in this study who

Table 1: Age & Sex wise distribution of epidemiological variables

Variables		=20yrs		21-40yrs		41-60yrs		=61yrs	
		M/93 (13.02)	F/143 (20.03)	M/129 (18.07)	F/253 (35.43)	M/30 (4.2)	F/48 (6.72)	M/6 (0.85)	F/12 (1.68)
R	Urban	34 (4.76)	38 (5.32)	42 (5.88)	63 (8.82)	6 (0.84)	7 (0.98)	2(0.28)	-
	Rural	59 (8.26)	105 (14.73)	87 (12.18)	190 (26.61)	24(3.36)	41(5.74)	4 (0.56)	12 (1.68)
O	H. W.	-	22(3.08)	-	236(33.05)	-	45(6.3)	-	12(1.68)
	Labour	10(1.4)	10(1.4)	97(13.58)	8(1.12)	23(3.22)	2(0.28)	5(0.7)	-
	Business	-	-	25(3.5)	5(0.7)	5(0.7)	1(0.14)	1(0.14)	-
	Job	-	1(0.14)	5(0.7)	-	2(0.28)	-	-	-
	Students	35(4.9)	66(9.27)	2(0.28)	4(0.5)	-	-	-	-
	Others	48(6.76)	44(6.18)	-	-	-	-	-	-
S	Low	71(9.94)	105(14.73)	75(10.5)	179(25.07)	23(3.22)	33(4.62)	5(0.7)	11(1.54)
	Middle	17(2.38)	27(3.78)	31(4.34)	49(6.86)	6(0.84)	13(1.82)	-	1(0.14)
	High	5(0.7)	11(1.54)	23(3.22)	25(3.5)	1(0.14)	2(0.28)	1(0.14)	-
E	Illiterate	57(7.98)	72(10.08)	83(11.63)	161(22.57)	19(2.66)	40(5.6)	5(0.7)	8(1.12)
	Primary	23(3.22)	21(2.94)	18(2.52)	73(10.22)	5(0.7)	7(0.98)	-	4(0.56)
	Secondary	13(1.82)	45(6.3)	14(1.96)	14(1.96)	4(0.56)	-	1(0.14)	-
	H.S.	-	5(0.7)	14(1.96)	5(0.7)	2(0.28)	1(0.14)	-	-
M	Married	3(0.42)	26(3.64)	111(15.55)	244(34.18)	30(4.2)	47(6.58)	6(0.84)	12(1.68)
	Un marr.	90(12.6)	117(16.39)	18(2.52)	9(1.26)	-	1(0.14)	-	-

*R-residence, O-occupation, S- socio economic status, E-education, M-mariteal status, H.S.-higher secondary, Figure in parenthesis indicates percentages

Table 2 : Time wise distribution of burn cases

Time of occurrence		5am-10am	11am-4pm	5pm-10pm	11pm-4am
No / % of patients		347(48.59)	79(11.06)	208(29.13)	80(11.22)
Nature of burn	Accidental	341(47.75)	79(11.06)	179(25.11)	62(8.72)
	Homicidal	1(0.14)	-	6(0.8)	15((2.1)
	Suicidal	5(0.7)	-	23(3.22)	3(0.4)
Age (yrs) / Av. (range)		26.9 (1-84)	23.7 (1-65)	26.9 (2-90)	27.8 (1-75)
Sex	Male	131(18.35)	33 (4.62)	72 (10.08)	22 (3.08)
	Female	216 (30.27)	46 (6.44)	136 (19.04)	58 (8.12)

Table 3 : Age & Sex wise distribution of clinical variables

Variables		=20yrs		21-40yrs		41-60yrs		=61yrs	
		M/93 (13.02)	F/143 (20.03)	M/129 (18.07)	F/253 (35.43)	M/30 (4.2)	F/48 (6.72)	M/6 (0.85)	F/12 (1.68)
Place(Home)		92(12.88)	142(19.89)	124(17.37)	251(35.16)	28(3.92)	48(6.72)	6(0.84)	12(1.68)
T	Flame	53(7.42)	115(16.12)	121(16.95)	245(34.31)	29(4.06)	47(6.58)	6(0.84)	11(1.54)
	Scald	37(5.18)	26(3.64)	4(0.56)	4(0.56)	1(0.14)	-	-	-
	Electrical	3(0.42)	2(0.28)	4(0.56)	4(0.56)	-	1(0.14)	-	1(0.14)
N	Acidental	91(12.75)	135(18.9)	124(17.37)	220(30.82)	30(4.2)	44(6.16)	6(0.84)	11(1.54)
	Homicidal	-	3(0.42)	1(0.14)	16(2.24)	-	1(0.14)	-	1(0.14)
	Suicidal	2(0.28)	5(0.7)	4(0.56)	17(2.38)	-	3(0.42)	-	-
Assoc. illness		1(0.14)	4(0.56)	5(0.7)	24(3.36)	3(0.42)	9(1.26)	-	2(0.28)
Av. TBSA		26.67	48.82	35.67	57.52	31.63	57.17	30.17	40.25
D	Sup. ficial	57(7.98)	45(6.3)	61(8.54)	53(7.42)	16(2.24)	11(1.54)	5(0.7)	5(0.7)
	Deep	36(5.04)	95(13.31)	64(8.96)	188(26.33)	14(1.96)	36(5.04)	1(0.14)	7(0.98)
	Mixed	-	3(0.42)	4(0.56)	12(1.68)	-	1(0.14)	-	-
H. T.	=6hrs	69(9.66)	85(11.9)	95(13.31)	121(16.96)	16(2.24)	22(3.08)	5(0.7)	5(0.7)
	7-12hrs	22(3.08)	50(7)	26(3.64)	112(15.69)	11(1.54)	22(3.08)	1(0.14)	5(0.7)
	=13hrs	2(0.28)	8(1.12)	8(1.12)	20(2.8)	3(0.42)	4(0.56)	-	2(0.28)

*T-type, N-nature, Av.-average, D-depth, H.T.-hospitalisation time, Figure in parenthesis indicates percentages

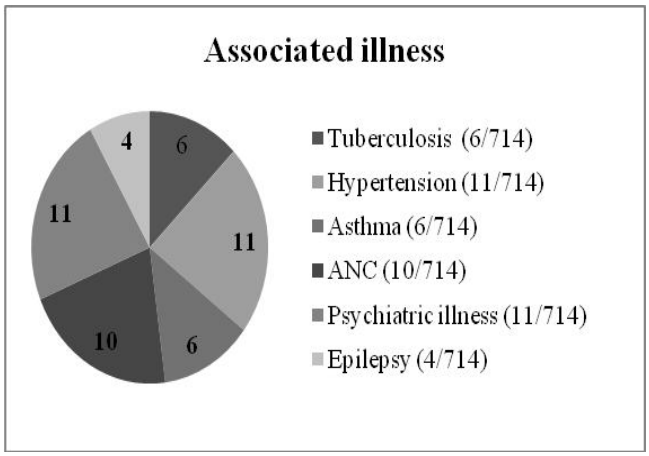

Fig 1: Showing associated illness

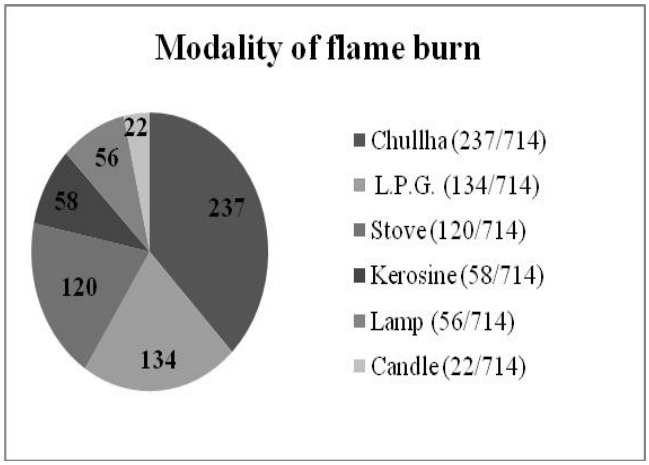

Fig 2: Showing modality of burn

sustained chemical injury. Percentages of modality for flame burn injury are as shown in Fig.-(1). Accidental 92.58%, homicidal 3.08% and suicidal 4.34% were different nature of burn (time distribution -Table-2). Average (Av.) TBSA of burn in male & female was 31.03%, 50.94% respectively. Average TBSA of burn in female was higher than male in all age group. Deep burn ($2^0 3^0$) was seen in 61.78% cases with Av. TBSA-61.57%, superficial ($1^0 2^0$) burn was seen in 35.43% cases (Av. TBSA-15.91%) & mixed ($1^0 2^0 3^0$) in 2.8% cases (Av. TBSA-89.55%). Female 45.68% and male 16.1% sustained deep burn.

Associated illness as shown in Fig 1 was found only in 6.72% cases. Commonest condition was hypertension (1.54%) & psychiatric illness (1.54%). In this series within 6hrs 58.54%, 7 to12hrs 34.87% and e"13hrs in 6.59% of cases were hospitalised. Around 46.36% patients died, mortality for male was 20.24% & for female was 79.76%. Septicaemia 42.21% was most common modality of death. Mean duration of hospital stay in all patients was 13.6 days. This was 14.4 days for the male group and 13.1 days for the female group. Mean duration for patients who died was 7.7 days and for those who survived, it was 18.7 days. Length of stay in 61.9% was less than 10 days, 28.99% stayed between 11-30 days and 9.11% of them stayed over 30 days. Mean duration of hospital stay due to flame, scald and electrical was 13.6 days, 13.1 days, 16.4 days respectively. Length of stay in d"30% TBSA of burn was less than 12.7 days, 25.2 days in TBSA 31-60% & 5.7 days in TBSA e"61%. Mean duration of hospital stay in superficial burn was 13 days, in deep burn 14.3days & in mixed 5 days.

Discussion

Burns are serious but preventable accidents[6] and without recognition of affecting factors we cannot plan any preventive program. Due to differences in cultures, habits, behaviours and socio-economic conditions in different countries and regions it is important to obtain epidemiological data for each of them separately. In this study we looked at the risk factors, epidemiological & clinical aspects of the burn patients.

The incidence of burn is 0.84% of total hospital admissions and 3.65% of total surgical admissions similar to other study.[7]

Age and sex are essential elements of any epidemiological study.[8] The present study revealed that more than half the cases were aged between 21-40 years followed by d" 20 years, confirms other studies.[3,9] High incidence among young adults may be explained by the fact that they are generally active and exposed to hazardous situations both at home and at work. However, low percentage of old people in the present study might be explained by the social structure in our setup as older members usually live within the family, thus decreasing their exposure to hazardous situations.

In our study Female: Male ratio of total burn patients is 1.77:1 similar that of studies.[2, 10] Married female 46.07% suffered more than married male 21%. Housewives 44.12% are most commonly affected. Among men, 18.07% of the victims belonged to the age group of 21 to 40 years. The factors attributed to burns among men were unemployment, depression and stressful situations. In contrast, 35.43% of women belonged to the age group of 21 to 40 years[2] and the triggering factor for burns were young age at the time of marriage combined with inability to cope with the physical and psychological stress of marriage,[2] harassment from parents-in-law, inadequate precautions during cooking and wearing of the loose Indian sari.[11]

Most 70.31% patients belonged to lower socioeconomic group consistent with study.[3] Burn was more common in illiterate person 62.32% similar to study.[12] In the present study, most burns were accidental. Suicidal cases were 4.34% similar to study.[13] In the causes of burn injury, flame was the most common agent affecting more than four-fifth of cases followed by scald and electrical similar to studies.[9, 14, 15] The high incidence of flame burn is explained by use of oil for lamps in villages, candle for lighting, substandard kerosene and gas stoves, use of open coal and wood fires chullha for warmth and cooking in villages and use of pressure stoves for cooking in urban areas. Open coal or wood fires chullha were the most common source and were responsible for 33.19% total cases. This is consistent with the findings of study in developing countries. [16] On the other hand, the picture reported from industrialized countries differs, where flammable liquids and gas stoves were the most common source of flame burns.[17] The kerosene stoves used were of inferior quality.[18] Burns due to industrial accidents were far less encountered during the study was due to the predominantly agrarian rather than industrial population around the study area. Scalds were observed mostly in children because of the carelessness and restlessness associated with them. Homes were the site of accident in 98.46% of burns, with remaining occurring outdoor places such as work. This figure is comparable to other reports from developing countries.[19, 20] However, figures from industrialized countries are clearly lower than those reported from developing countries. This may be due to the relatively higher percentage of occupational and recreational burns or due to better home safety with safer cooking and heating devices in industrialized countries.[21, 22] Out side home 72.73% male had burn in contrast to female 27.27%. In present study 6.72% patients had associated illness, of which hypertension & psychiatric illness each 1.54% were commonest. Diabetes mellitus was commonest & epilepsy was 6th in order in a study from libiya.[9] psychological disorder followed by ante natal care was commonest associated illness in another study.[11]

Maximum average total body surface area (TBSA) of burn 46.59% occurred in 21-40yrs age group. In all age groups female exceeded male for total body surface area of burn. The extent burn along with weight determines the amount of fluid required for resuscitation & maintenance. In all age groups female exceeded male for degree / depth of burn. The assessment of depth determines hospital stay, morbidity & mortality. Majority of patients who left against medical advice were females. This shows the discrimination against the females.

The high mortality rate 46.38% may be explained by the high incidence of major flame burns, delay in seeking medical help, higher degree &TBSA of burn, high incidence of septicaemia and lack of resources both on part of the patients and the hospital. This compares favourably with the mortality reported in other study.[12,23] The duration of admission is closely related to the cause of death.[12] Sepsis was the leading cause of death in our series 43.2%, similar to that of other study.[10]

Mean duration of hospital stay for all patients, for patients who died, for those who survived and percentages of population for length of stay in less than 10 days, between 11-30 days and over 31 days were all similar to a study from Iran.[24]

Conclusion

Married female (house wife) within 21 to 40 yrs age were commonest victims of burns of flame type. Most burns occurred at home during early part of day time were accidental in nature due to use of open coal as well as wood fires chullha and carried considerable mortality. Most of them were illiterate, belonged to low socio-economic status & neglected for immediate hospitalisation. These facts should help to formulate efforts to educate house wife for risk factors. So measures should be taken to provide proper education to prevent these accidents and ensure safety.

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