An epidemiological study of adult female burns patients admitted in a tertiary care hospital

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ABSTRACT

Purpose: Burn injuries usually results in significant morbidity and mortality around the globe. The study was planned to throw light on exact nature of the incident of burn injury and to gain an insight into epidemiological determinants of burns patients.
Materials and Methods: A cross-sectional descriptive study was conducted over a period of one year from May 2009 to April 2010. Universal sampling method was employed. All adult female burns patients above 18 years of age who were admitted in burns unit of a tertiary care hospital were included in the study. The patients or legally accepted guardians, in case of serious patients, who did not give consent were excluded from the study. Total number of study participants was 103. A Semi-structured questionnaire was used for obtaining socio-demographic details and details about burns injury. Statistical analysis was done using SPSS-17 version. Institutional Ethics committee approval (Committee for Academic Research Ethics (approval number): 037 / 2009) was obtained.
Results: Flame burn was the most common cause of burns accounting for 80.6% of the total burns. Scald burn was seen in 17(16.5%) subjects and electric burn in only 3(2.9%) subjects. Overall case fatality rate was found to be 35%.
Conclusion: Total body surface area burnt was found to be significantly associated with mode of burns, marital status, kitchen burns while mortality among burns victims was found to be significantly associated with duration of marriage, mode of burns, total body surface area involved, dowry given and presence of domestic violence.
Keywords: Burns, mortality, flame burn, scald burn

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INTRODUCTION

Injuries represent one of the most important public health problems faced by both developing and developed nations today. Injuries may be intentional or non-intentional; but intent is sometimes difficult to determine for injuries such as burns. Fire was perhaps, man's first double-edged sword, for throughout history, it has served as well destroyed mankind [1]. Goldman describes burns as *"the silent epidemic"* [2]. Burns represent an extremely stressful experience for both the burn victims as well as for their families. An extensive burn profoundly affects the patient's physique, psyche, financial situation and socio-cultural dynamics of the family. Patients with extensive burns frequently die, and for those with lesser injury, physical recovery is slow and painful as well. In addition to their dramatic physical effects, burn injuries frequently cause deleterious psychological complications.

In developed countries like USA, the magnitude of burns injury is 450,000 per year, 3500 deaths per year and 45,000 hospitalizations per year [3]. In a study done in Iran, mortality rate among the hospitalized burn victims was observed to be 25.9% [4]. In India, approximately, there are 6 million burns cases annually, of which around 0.7 million cases require hospitalization, of which approximately, 0.12 millions die annually. Survival rate for burns patients in developing countries like India is around 50% for burns less than 40% while those in developed countries it is around 75-90% for 50% burns. Burn injuries cause significant morbidity and mortality, both in developing and developed countries and have considerable physical, psychological and economic effects on the patients, their families and society [5]. In another study done in Iran, it was concluded that among the domestic injuries, burns are a major public health problem for women of reproductive age [6].

Despite many medical advances, burns continue to remain a challenging problem due to the lack of infrastructure, inadequate number of trained professionals as well as the increased cost of treatment, all of which have a significant impact on the outcome. The best treatment of thermally injured is undisputedly burns prevention. It is said that burns is a preventable disaster and more than 80% burns injuries can be prevented.

There is little information on the pattern of outcome among burns patients and their rehabilitation. It is of vital importance to know the social factors associated with burn injuries especially in case of female patients. Also the burn injuries hampers multiple activities of the daily living, contributes to work absenteeism and causes physical and psychological scarring.

Hence, this study was conducted to throw light on the exact nature of the incident of burn injury and to gain an insight into the epidemiological determinants of burns patients. This study has its significance in the form that subsequently to burns female patients undergo mental anguish and social stigma which in turn leads to deterioration of family life. The findings of study will help in identifying the crucial socio-cultural and demographic factors which play an important role in occurrence of burns injuries and areas in which interventions by the social agencies and the Government is desired.

MATERIALS AND METHODS

A cross-sectional descriptive study was conducted over a period of one year from May 2009 to April 2010. The study was conducted in burns unit of the Department of Plastic Surgery of a tertiary care hospital. Universal sampling technique was employed for selection of study participants.

Inclusion and Exclusion Criteria: All the female burns patients above 18 years of age who were admitted during the study period and gave consent for the study were included. The patients or legally accepted guardians, in case of serious patients, who did not give consent were excluded from the study. Also, patients who expired prior to the interview were excluded from the study.

Altogether 107 burns patients were admitted during the study duration. Of these, 03 patients did not give consent for the study and hence were not included, 01 patient expired prior to the first interview and hence was excluded from the study. Thus, the total sample size was 103.

A semi-structured questionnaire was designed after reviewing the literature. On pilot basis, 7 women were interviewed to test validity and response. The questionnaire was then suitably modified and used as the tool for data collection. The questionnaire included socio-demographic details of the participant as well as details about the burns injury. Participants were interviewed face to face after obtaining their informed consent after they were stabilized in the burns unit of Department of Plastic Surgery. The help of the nursing staff and female medical social worker was taken to establish rapport with the subjects and their relatives. The extent of burn injury was calculated according to Wallace rule of nine based on total body surface area (TBSA) burnt which was later re-confirmed with the help of treating surgeon [7].

The study participants were then followed up during their hospital stay till their discharge to note their outcome whether they survived or not.

Kuppuswamy's method of socioeconomic status was used to determine social class to which women belonged [8].

Ethical considerations: Ethical clearance was obtained from the Institutional Ethics committee prior to the start of the study. Ethics

approval: Committee for Academic Research Ethics (approval number): 037 / 2009. Written informed consent was obtained from the study participants before obtaining any information from them. Utmost care was taken to maintain privacy and confidentiality.

Data analysis: Data entry and statistical analysis was done using SPSS version 17. Frequency distributions were calculated for all the variables. Chi square test was used for testing the significance of association between socio-demographic parameters and burn injury at p value of 0.001.

RESULTS

In the present study, majority of the women 63(61.2%) were in the age group of 18-30 years. 21(21.4%) were in the age group of 30-45 years. Mean age was 31.4 years with standard deviation of 13.3 years. 78(75.7%) women were belonging to Hindu religion while only 23(22.3%) women belonged to Muslim religion. As regards to education, 23(22.3%) women were illiterate, 31(30.1%) were educated up to primary level, 28(27.2%) up to secondary level and 9(8.7%) women were graduates and above. Majority 74(71.8%) women were housewives while 5(4.9%) women were involved in skilled and professional work.

Table 1 shows the details about burns injury. It shows that flame burn was the most common cause of burns accounting for 80.6% of the total burns.

Table 1. Details about burns injury

Details about burn injury	Number	Percentage
Mode of burns		
Flame	83	80.6
Scald	17	16.5
Electrical	3	2.9
Nature of burns		
Accidental	89	86.4
Suicidal	2	1.9
Homicidal	10	9.7
Percentage of TBSA involved		
< 25%	29	28.1
25 - 50%	38	36.8
50 - 75%	30	29.1
> 75%	6	5.8
Site of burns		
Head / neck / face	53	51.4
Upper limb	67	65.0
Lower limb	56	54.3
Trunk	39	37.8
Genitalia	14	13.5
First aid measure used		
Poured water	75	72.8
Covered with blanket	11	10.6
Others	6	5.8
None	11	10.6

Time interval between burns injury & hospitalization		
< 1 hour	53	51.5
1 - 6 hours	36	35.0
> 6 hours	14	13.6

No cases of chemical burns were found. Among flame burns, it was seen that kerosene stove was the most common cause of flame burns seen in 56(67.5%) subjects. Other causes included *chullah* in 10(12%) subjects, LPG gas in 9(10.8%) cases. Pouring of kerosene accounted for 5(6%) cases. According to the subject, accidental burns accounted for 86.4% burns i.e. in 89 cases while homicidal burns accounted for 9.7% cases. Upper limb (65%) and lower limb (54.3%) involvement was seen to be most commonly involved. Pouring of water was found to be the most common first aid measure adopted at the place of burns injury in 75(72.8%) cases to extinguish fire.

Table 2 shows the distribution of socio-demographic variables based on the TBSA burnt. A significant association was also found between TBSA burnt and use of floor for cooking purpose. A highly significant statistical difference was found between TBSA burnt and mode of burns, flame burns accounting for 34(94.4%) cases in burns involving > 50% TBSA.

Table 2. TBSA burnt according to socio-demographic variables

Socio-demographic variables	**TBSA burnt**		**Total**	**p value**
	<50%	**>50%**		
Age group (years)				
18 – 30	45 (71.4%)	18 (28.6%)	63 (100%)	0.214
30 – 45	12 (57.1%)	9 (32.9%)	21 (100%)	
45 – 60	6 (66.6%)	3 (33.4%)	9 (100%)	
> 60	4 (40%)	6 (60%)	10 (100%)	
Marital status				
Single / widow	17 (89.4%)	2 (10.6%)	19 (100%)	**0.013**
Married	50 (59.5%)	34 (40.5%)	84 (100%)	
Arrangement of kitchen (n = 86)				
Floor	29 (49.2%)	30 (50.8%)	59 (100%)	**0.004**
Platform	22 (81.5%)	5 (18.5%)	27 (100%)	
Mode of burn				
Flame	49 (59%)	34 (41%)	83 (100%)	**0.009**
Scald / Electrical	18 (90%)	2 (10%)	20 (100%)	
Nature of burns [a,b] (n = 101)				
Accidental	58 (65.2%)	31 (39.8%)	89 (100%)	0.568
Suicidal	1 (50%)	1 (50%)	2 (100%)	
Homicidal	8 (80%)	2 (20%)	10 (100%)	

[a] All are medico-legal cases and nature of burns is subject to judicial proceedings but here it was taken according to the subject and their relatives

[b] Remaining 2 subjects were critical and were not in a state to tell the nature of burns

Table 3 depicts the outcome distribution based on the socio-demographic parameters. Among the study subjects overall case fatality rate was 35%. Majority of the deaths, 24(66.6%), occurred in 18-30 years age group. It was observed that the proportion of mortality increased as the age increased.

Table 3. Outcome of burns patients according to socio-demographic variables

Socio-demographic variables	Outcome		Total	p value
	Survival	Death		
Age (years)				
18 – 30	39 (61.9%)	24 (38.1%)	63 (100%)	0.111
30 – 45	18 (85.7%)	3 (14.3%)	21 (100%)	
45 – 60	4 (44.4%)	5 (55.6%)	9 (100%)	
> 60	6 (60%)	4 (40%)	10 (100%)	
Marital status				
Single / widow	14 (73.7%)	5 (26.3%)	19 (100%)	0.382
Married	53 (63.1%)	31 (36.9%)	84 (100%)	
Duration of marriage (n = 84)				
< 7 years	19 (48.7%)	20 (51.3%)	39 (100%)	**0.011**
> 7 years	34 (75.5%)	11 (24.5%)	45 (100%)	
Nature of burns [a] (n = 101)				
Accidental	60 (67.4%)	29 (32.6%)	89 (100%)	0.792
Suicidal	1 (50%)	1 (50%)	2 (100%)	
Homicidal	6 (60%)	4 (40%)	10 (100%)	
Mode of burns				
Flame	48 (57.8%)	35 (42.1%)	83 (100%)	**0.001**
Scald/ Electrical	19 (95%)	1 (5%)	20 (100%)	
TBSA burnt				
< 50%	60 (89.5%)	7 (10.5%)	67 (100%)	**0.0001**
> 50%	7 (19.5%)	29 (80.5%)	36 (100%)	
Dowry given				
Domestic violence present	4 (28.5%)	10 (61.5%)	14 (100%)	**0.028**
Domestic violence not present	8 (72.7%)	3 (27.9%)	11 (100%)	
Dowry not given				
Domestic violence present	12 (48%)	13 (52%)	25 (100%)	**0.0007**
Domestic violence not present	30 (88.2%)	4 (11.8%)	34 (100%)	

[a] Remaining 2 subjects were critical and were not in a state to tell the nature of burns

Although the survival was highest in the lower middle class (72.5%), statistically no significant association was found. Statistically significant association was found between duration of marriage and outcome of burns injury, lesser the duration of marriage more was the proportion of mortality. It was also observed that presence of domestic violence was significantly associated with death as an outcome among the subjects.

DISCUSSION

The epidemiology of burns varies from one part of the world to another as it depends on the level of civilization, industrialization, and culture among other things [9]. Also, lack of uniformity between methodologies in addition to the existence of a plethora of variables and differences in the periods of study makes any comparison with other studies difficult [10]. Burn injuries and their related morbidity, disability, and mortality represent a public health problem of increasing importance especially in developing countries [11].

In the present study, 63(61.2%) of the women are in the age group of 18-30 years. Similar results were obtained in a study done in South India which observed that 40.9% of the female victims belonged to the age group of 15-24 years [12]. Another study on burnt wife syndrome reported that 85% cases of burnt wives were between the age of 16-30 years and the rest 15% were beyond the age of 30 years [13]. However in a study done in Iran, almost 31.8% of the burn patients were in the 16-25 year age group [4]. High incidence among young women might be explained by the fact that they are generally active and exposed to hazardous situations at home and also dowry deaths.

Flame burn was the most common cause of burns accounting for 80.6% of the total burns, kerosene stove accounting for 67.5%, followed by scald burn seen in 17(16.5%) subjects in the present study. This was probably because of faulty and unsafe cooking practices. Similar results were obtained in various studies done in India as well as in other countries [4, 14 - 17]. In another study done in Iran, 37.7% of all women and 32.3% of women in the reproductive age group were injured by hot liquids [6].

In our study, upper limb and lower limb involvement was most commonly involved while in a study done in Jammu, mainly trunk (49%) followed by lower limbs (40%) and head and neck (21%) were the sites involved [18]. In the current study, 53(51.5%) subjects were hospitalized within one hour of burns injury. It shows that people were aware of importance of immediate hospitalization which is very important for burns patients for their resuscitation and treatment. In contrast to our findings, a study in Indore observed that only few patients (9.7%) arrived in hospital within six hours of the incidence [14]. Also, a study done in Pakistan reported that nearly half of the patients presented within 12 hours (46%) to hospital [19].

In our study, flame burns accounted for more extensive burns than scalds and electrical because of more body surface involved. Similar results were observed in a study in Indore [14]. Majority of the subjects, 30(85.7%), in our study with > 50% TBSA involvement were using floor for cooking purpose. Similar results were obtained in a study done in Mumbai which reported that 76 women cooked at *sigris* on the floor. In 98% of cases the cause of burns was an exploded pressure stove on the floor [20].

In the present study, overall case fatality rate was found to be 35%. It was observed that the proportion of mortality increased as the age increased. Similar findings were reported by a study done in Egypt 9. In a study done in Queensland in Australia, the overall mortality rate was found to be 3·6 per cent. The risk of death increased with increasing age (RR 7·32 (3·08–17·42) if aged more than 48 years; $P < 0·001$) [21].

The association between duration of marriage and mortality was found to be statistically significant in our study. It shows that initial years of married life are particularly vital with regards to such injuries and might as well suggest that these might not be accidental in nature. Such comparisons were not found to be made by other researchers. In our study, mortality was highest in flame burns 35(42.1%) followed by scald 1(5.8%) with no mortality in electrical burns. Similar findings were observed by a study in Nigeria which reported that most of the deaths (53, equal to 91.4%) occurred in patients who had sustained flame burns [22]. Also, a study done in Pakistan reported similar findings that mortality was high among patients with flame burns (16.53%) [23].

A highly significant association was observed between TBSA burnt and outcome of cases i.e. as the TBSA increased, mortality rate increased. Similar results were also obtained in studies done in Indore, Aligarh and Israel [14, 24, 25].

In our study, among the subjects who had no domestic violence, survival was seen in 30(88.2%) subjects. It shows that it was domestic violence which was important for early identification so that such untoward mishaps can be averted.

The present study had its limitations in the form that it was carried out in a tertiary care hospital and hence, there is a possibility of selection bias considering that only serious patients are being referred to a tertiary care institute. In addition a long duration study needs to be done for the long term follow up of female burns victims.

CONCLUSIONS

All the burns injuries in the present study were domestic in nature with kitchen burns accounting for 83.6%. Faulty and unsafe cooking practices are mainly responsible for domestic burn injuries. Training regarding safety measures like periodic maintenance of gas stoves, gas pipes, use of LPG regulators, etc. must be inculcated among the general population using mass media

communication to its maximum effect. Directories of gas service stations should be maintained at home so as to ensure immediate repair of any fault in the cooking appliances. There should be high index of suspicion for early identification of subtle signs of domestic violence among females so as to avoid such untoward consequences. A multi pronged preventive strategy based on four Es namely, education, engineering, enforcement, and emergency care is advocated.

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Conflict of interest statement

There was no conflict of interest to be stated.

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