

A 1 YEAR PROSPECTIVE STUDY OF BURN INJURIES ADMITTED IN A TERTIARY CARE TEACHING HOSPITAL IN NORTH KARNATAKA, INDIA

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ABSTRACT

Background and objectives: Burn injuries are one of the most tragic of all injuries throughout the world. This study was done to assess the socio demographic profile, type and source of burn, mode, outcome and severity of the burn injuries so that an effective need based awareness can be generated among the general population to address the most vulnerable population of women and children, industrial and hazardous occupational workers.

Methods: A 1 year prospective study of all burn injury patients admitted in Hangal Shri Kumareshwar Hospital and medical research center, Bagalkot from January 1st to December 31st, 2014 were included in the study after informed consent. Data was collected on a pre-designed and pre-tested questionnaire from the patient or their care taker. Ethical clearance was obtained from Institutional review board. Data was analyzed using chi square test and percentages.

Results: Ninety-two patients were admitted to the burns ward of Hangal Sri Kumareshwar Hospital, Bagalkot during the study period. The number of male patients was 47 contributing to 51.09% of the admissions. Majority (38.04%) was between 21-30 years of age. Majority of the injuries (80.43%) occurred at home whereas 19.57% occurred outdoors ($p=0.0022$). Majority of the injuries (72.82%) were alleged accidental. It was observed that majority (38.04%) succumbed to their burn injury. With regard to females injured, 48.89% died whereas 40.43% of the males recovered ($p=0.0133$).

Conclusion: Burn injury is a preventable cause of death if caution is taken by all concerned

Keywords: Burn injury, Admissions

INTRODUCTION

Burn injuries are one of the most tragic of all injuries throughout the world. In India, about 6-7 million people suffer from burn injuries per year. Out of them, 7 lakh require hospital admission and 2.4 lakh become disabled. Annually about 1.4 lakh people die of burn injuries, leading to one death every 4 minutes. Majority of the burn victims are from the socially and economically backward group. During the last 5 years, there has been an increase in admissions up to 4.5 times.¹ The high incidence is attributed to illiteracy, poverty, and a low level of safety consciousness in the population.²

Burn injuries are a public health disaster due to the associated morbidity, mortality, rehabilitation and the need for high cost specialist services. Prevention is the best method to reduce the incidence and mortality rates of burns. The first step in the prevention of burn injuries is to identify the various epidemiological factors related to burns. This study was done to understand the socio demographic profile of the injured, type and source of burn, mode, outcome and severity of the burn injuries for an effective need based awareness to be generated among the general population to address the most vulnerable population of women and children, industrial and hazardous occupational workers.

MATERIALS AND METHODS

A 1 year prospective study of all burn injury patients admitted in Hangal Shri Kumareshwar Hospital and medical research center, Bagalkot from January 1st to December 31st, 2014 were included in the study after informed consent. For the purpose of the study, the term burn injury was defined as a body lesion due to an external cause, either intentional (alleged homicidal or suicidal) or unintentional (alleged accidental) resulting from a sudden exposure to energy (mechanical, electrical, thermal, chemical or radiant) generated by agent host interaction. Data was collected on a pre-designed and pre-tested questionnaire from the patient or their care taker. Ethical clearance was obtained from Institutional review board. Data was analyzed using chi square test and percentages. Total burn surface area was calculated using Rule of nine.

RESULTS

Demographics: Ninety-two patients were admitted to the burns ward of Hangal Sri Kumareshwar Hospital, Bagalkot during the study period. The number of male patients was 47 contributing to 51.09% of the admissions. Hindus contributed to 86.96 % of the patients and the remaining were Muslims. Majority (38.04%) was between 21-30 years of age. Age and sex distribution of patients is

shown in Fig.1. Maximum number of patients (73.91%) were from rural areas of Bagalkot and neighboring districts. (Figure 2 and Table 1)

Time and place of burn: The Graph in Figure 3 shows the distribution of time of burn injury with peaks in the afternoon and evening. Majority of the injuries (80.43%) occurred at home whereas 19.57% occurred outdoors ($p=0.0022$) (Figure 4)

Mode of burn: Majority of the injuries (72.82%) were alleged accidental. Self harm resulted in 19.57% of the injuries. (Figure 5)

Type and source of burn: Flame burns were the most common type of burn injury contributing to more than three-fourths of all injuries (Figure 6). All electrical injuries were observed in males. Kerosene contributed to 40.21% of all injuries followed by 18.47% due to a kerosene stove. (Table 2)

Patient outcome: It was observed that majority (38.04%) succumbed to their burn injury. With

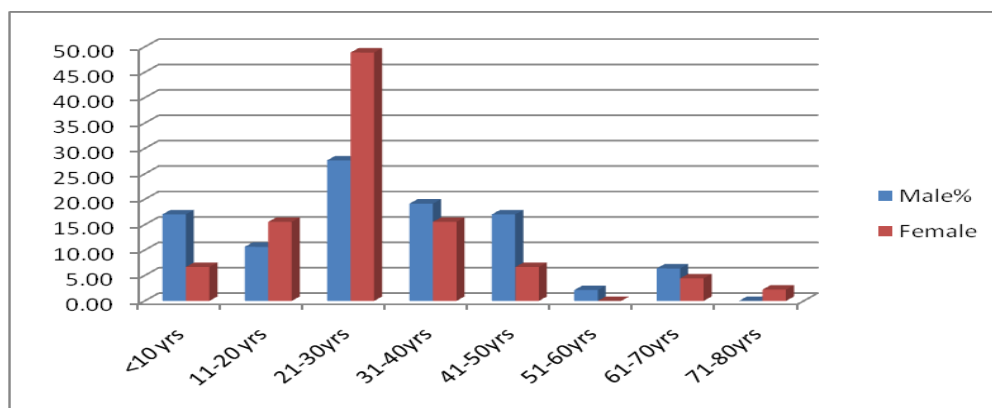
regard to females injured, 48.89% died whereas 40.43% of the males recovered. (Table 3)

Burn Size: In this study, majority of the females had more than 50% Total burn surface area whereas maximum number of males had less than 20% Total burn surface area($p=0.0052$). (Figure 7)

Mode of burn and outcome: Death was maximum in the alleged suicidal and alleged homicidal cases. It was noted that 61.11 % of the suicidal and 71.42% of the homicidal injuries succumbed to their injuries whereas in accidental cases 34.33 % recovered. (Table 4)

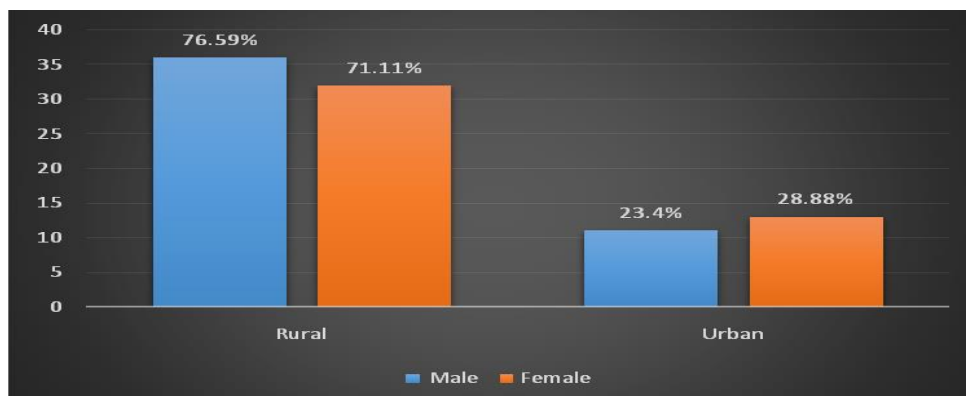
Causes for alleged suicidal burns: Out of 18 injures, 50% was due to a dispute, and 27.78% was due to depression and 22.22% (all male) allegedly self immolated themselves with kerosene under the influence of alcohol.

Causes for alleged homicidal burns: All the 7 homicidal injuries, was due to marital dispute.



DF = 5, $X^2 = 7.546$, $p = 0.183$

Fig. 1: Distribution according to age and sex

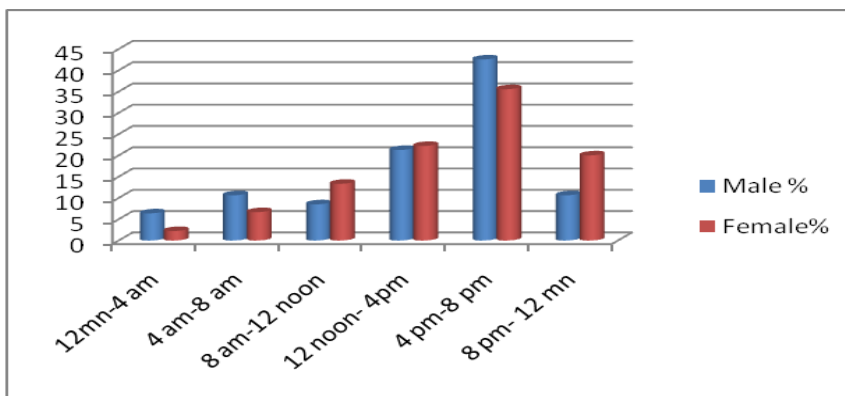


$x^2 = 0.058$, $p = 0.549$

Fig. 2: Distribution according to place of residence

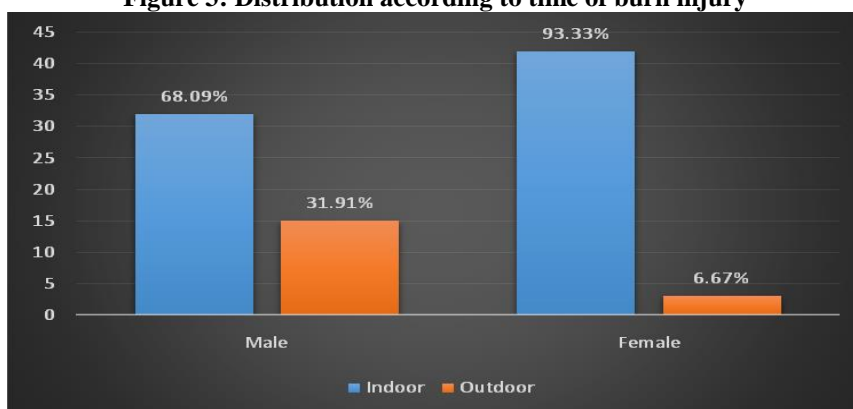
Table 1: Distribution of burn injury patients according to their district of residence

| District | Rural | % | Urban | % | Total | % |
|----------|-------|-------|-------|-------|-------|-------|
| Bagalkot | 42 | 61.76 | 22 | 91.66 | 64 | 69.56 |
| Bijapur | 13 | 19.12 | 1 | 4.17 | 14 | 15.22 |
| Koppal | 5 | 7.35 | 0 | 0 | 5 | 5.43 |
| Raichur | 1 | 1.47 | 0 | 0 | 1 | 1.09 |
| Belagavi | 4 | 5.88 | 0 | 0 | 4 | 4.35 |
| Gadag | 1 | 1.47 | 0 | 0 | 1 | 1.09 |
| Yadgir | 2 | 2.95 | 0 | 0 | 2 | 2.17 |
| Solapur | 0 | 0 | 1 | 4.17 | 1 | 1.09 |
| Total | 68 | 100 | 24 | 100 | 92 | 100 |



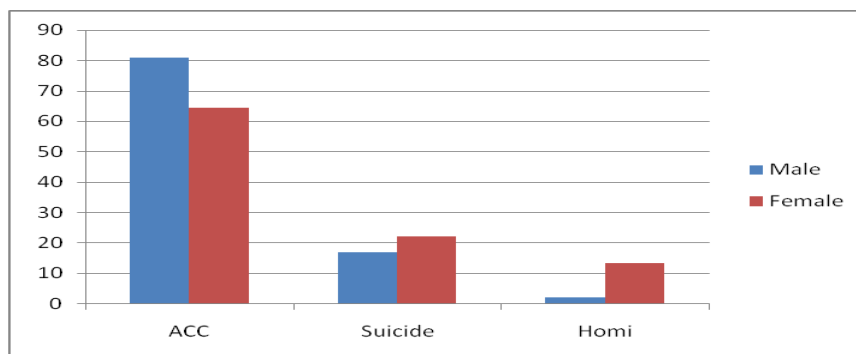
$x^2=3.279, p=0.512$

Figure 3: Distribution according to time of burn injury



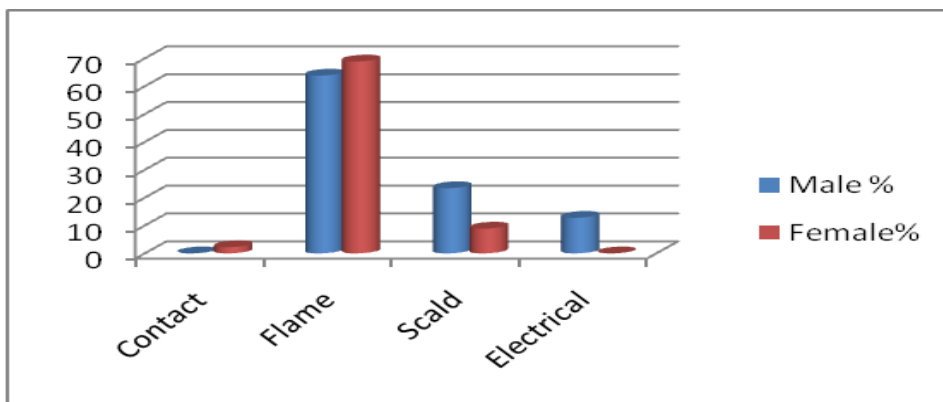
$x^2= 9.312, p=0.0022$

Figure 4: Distribution according to location of burn injury



$x^2=4.96, p=0.083$

Figure 5: Distribution according to mode of burn



$\chi^2 = 8.22, p=0.01$

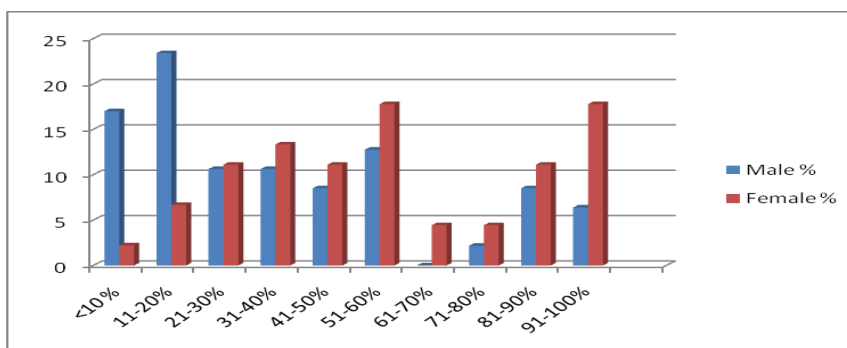
Figure 6: Distribution according to type of burn

Table 2

| Source of Burn Injury | Male | % | Female | % | Total | % |
|-----------------------|------|-------|--------|-------|-------|-------|
| Kerosene | 17 | 36.17 | 20 | 44.44 | 37 | 40.21 |
| Kerosene stove | 3 | 6.38 | 14 | 31.11 | 17 | 18.47 |
| Hot Water | 8 | 17.02 | 2 | 4.44 | 10 | 10.86 |
| Kerosene lamp | 4 | 8.51 | 2 | 4.44 | 6 | 6.52 |
| LPG | 2 | 4.25 | 2 | 4.44 | 4 | 4.34 |
| Live wire | 3 | 6.38 | 0 | 0 | 3 | 3.26 |
| Fire works | 3 | 6.38 | 0 | 0 | 3 | 3.26 |
| Hot sambar | 1 | 2.13 | 1 | 2.22 | 2 | 2.17 |
| Charcoal | 0 | 0 | 1 | 2.22 | 1 | 1.08 |
| Lightning | 0 | 0 | 1 | 2.22 | 1 | 1.08 |
| Fireplace | 0 | 0 | 1 | 2.22 | 1 | 1.08 |
| Hot tea | 0 | 0 | 1 | 2.22 | 1 | 1.08 |
| Electric board | 1 | 2.13 | 0 | 0 | 1 | 1.08 |
| Electric Motor | 1 | 2.13 | 0 | 0 | 1 | 1.08 |
| Electric Pole | 1 | 2.13 | 0 | 0 | 1 | 1.08 |
| Kerosene Bottle | 1 | 2.13 | 0 | 0 | 1 | 1.08 |
| Hot Milk | 1 | 2.13 | 0 | 0 | 1 | 1.08 |
| Hot Limestone | 1 | 2.13 | 0 | 0 | 1 | 1.08 |
| Total | 47 | 100 | 45 | 100 | 92 | 100 |

Table 3: Distribution according to outcome of the burn injury $\chi^2=10.72, p=0.0133$

| Out come | Male | % | Female | % | Total | % |
|------------------------|------|-------|--------|-------|-------|-------|
| Against medical advice | 4 | 8.51 | 5 | 11.11 | 9 | 9.78 |
| Death | 13 | 27.66 | 22 | 48.89 | 35 | 38.04 |
| Recovery | 19 | 40.43 | 5 | 11.11 | 24 | 26.09 |
| Residual Disability | 11 | 23.4 | 13 | 28.89 | 24 | 26.09 |
| Total | 47 | 100 | 45 | 100 | 92 | 100 |

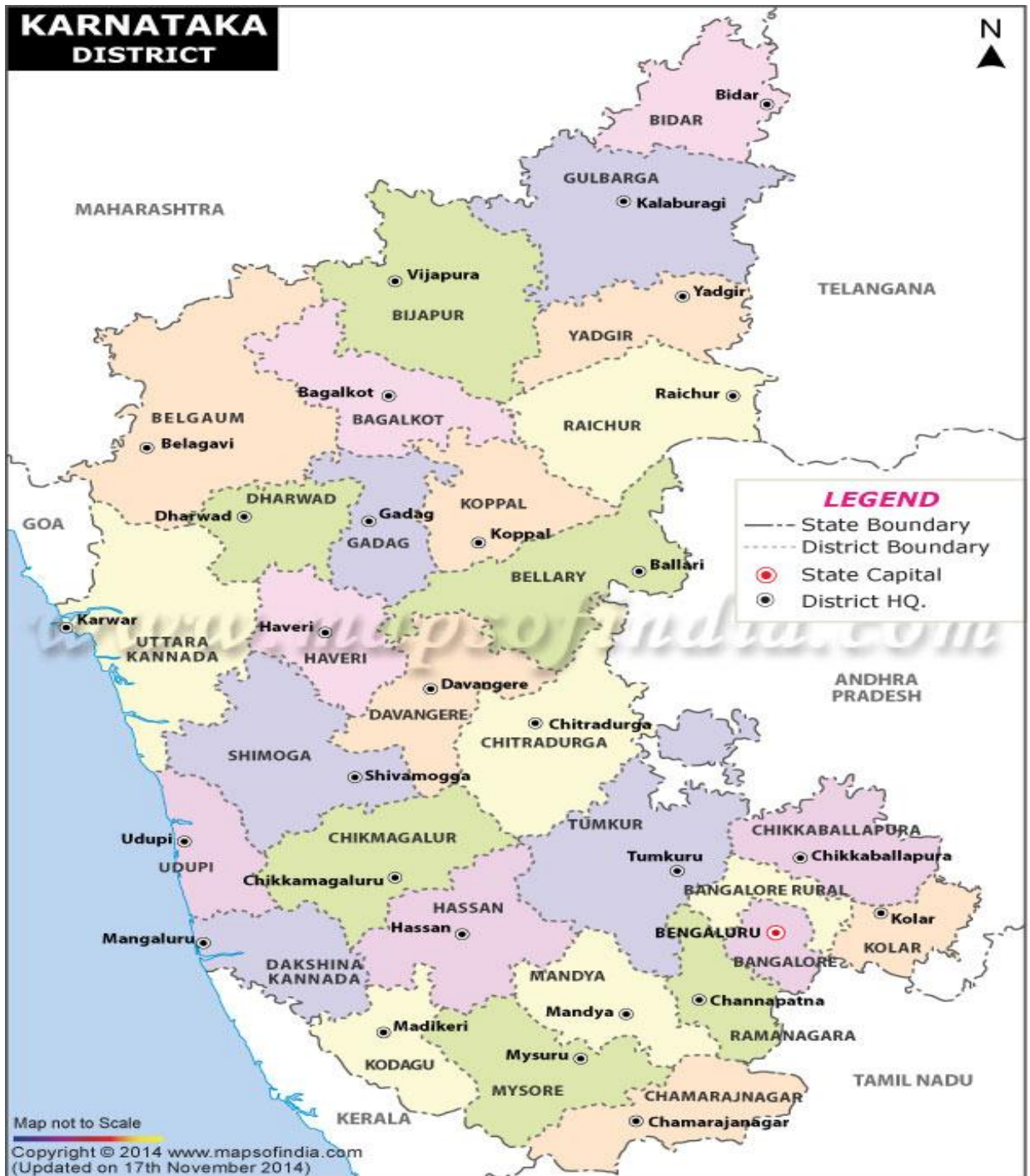


DF=2, $\chi^2=10.49, p=0.0052$

Figure 7: Distribution according to Total burn surface area

Table 4: Mode and outcome of burn injury $\chi^2=13.53, p=0.035$

| Outcome | Accidental | % | Suicidal | % | Homicidal | % | Total |
|---------------------|------------|-------|----------|-------|-----------|-------|-------|
| AMA | 6 | 8.95 | 2 | 11.11 | 1 | 14.29 | 9 |
| Death | 19 | 28.36 | 11 | 61.11 | 5 | 71.42 | 35 |
| Recovery | 23 | 34.33 | 1 | 5.56 | 0 | 0 | 24 |
| Residual Disability | 19 | 28.36 | 4 | 22.22 | 1 | 14.29 | 24 |
| Total | 67 | 100 | 18 | 100 | 7 | 100 | 92 |



DISCUSSION

The risk factors for burn injuries vary from one part of the world to another as it depends on the level of civilization, industrialization and culture of its people. Burn injury is a common public health problem in India, leading to high morbidity and mortality even to this day.

In this study, there was almost an equal distribution of injuries in both males and females. Regarding age distribution, majority (67.39%) were between 21-50 years of age which is the most economically productive age group. Almost 50% of females injured were between 21 -30 years of age. This finding is similar to other studies (3, 4, 5). This could be explained by women's close proximity to fire for cooking purposes, and their wearing long, loose flowing synthetic garments belonging to Indian culture.

Nearly three-fourths of the injured were from rural areas of Bagalkot and neighboring districts. Extensive burn injuries cannot be treated in the primary health care setting due to lack of facilities and are referred to the tertiary care teaching hospital that is nearby. The establishment of trauma care centers in each taluk head quarters is the need of the hour as valuable time is lost during referral. Maximum number of burn injuries occurring in rural areas has also been noted in other studies (6, 7). This could be explained by the use of cheap and unstable kerosene stoves for cooking and using kerosene lamps due to electricity problems and housing conditions of dim light.

Majority of the injuries occurred in the afternoon during cooking hours and also during evening hours when lighting and cooking equipment are used at home. This finding is very similar even to this day to a review done on burns in low and middle income countries (8). It will take time for things to change in such a huge, diverse and populous country like India. Homes are supposed to be safety havens for women and children but these findings indicate the grave danger in which they are living in.

Almost three-fourths were alleged accidental and 20% suicidal. This number is quite high compared to another study (4). Flame burns was the most common cause of injury and is similar to other studies (6,7) The most common source was kerosene followed by kerosene stove. These are still being used in rural households as there is no other alternative safer source. LPG gas stoves and solar cookers should be introduced on a war footing. It is high time that kerosene should be banned as India is moving forward globally in other domains technologically and scientifically.

Regarding suicidal injuries, dispute and depression were major contributing factors to take the extreme step. Self immolation with kerosene was the source in all the cases. About homicidal injuries, all

the injuries was due to marital dispute and the source was kerosene as it is easily available in households. Kerosene is thrown on the victim and then set ablaze.

Even to this day, kerosene is responsible for all the alleged suicidal and homicidal burn injuries in this part of the country. In the developed world, guns are used for the same purpose as they are easily available and handy during periods of stress.

In this study, about 50% of females injured succumbed to their injuries as majority had more than 50% total burn surface area. This is similar to other studies in India. (6, 7, 8, 9) The reason could be explained by the fact that women in this part of the country in rural areas wear the sari which is usually synthetic which will flare up immediately when it catches fire. Non flammable garments should be introduced to be worn in the home while handling dangerous equipment.

The overall mortality rate (38.04%) was high as patients with extensive burn injuries are admitted to our hospital as it is a tertiary care teaching hospital and most of the cases will be medico legal. This finding is similar to other reports: (5, 10, 11, 12)

CONCLUSIONS

From this study, it can be concluded that a severe burn injury is a serious issue and care should be taken while handling equipment at home and in the workplace. Vigilance of children at home should be a priority to prevent accidents. Burn injury is a preventable cause of death if caution is taken by all concerned. More safer cooking equipment should be introduced in the rural households.

We can expect hope on the horizon with the introduction of National Programme for prevention and Management of burn injuries by the Ministry of Health and Family Welfare, New Delhi, India in its Annual Report of 2013-2014. It is proposed in the 12th Five Year Plan and its aim is to reduce incidence, mortality, morbidity and disability due to burn injuries.⁽¹⁾

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CONFLICT OF INTEREST: Nil

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