*Original Article*

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# Profile of Burn Injury Cases and Medicolegal Formalities Done at Clinical Forensic Medicine Unit (CFMU) of MGIMS, Sewagram

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**Abstract**

Burn injury is main issue among the people of India since long back from the history, creating a formidable public health problem. Our objective of the present study is to measure the magnitude and epidemiology of burn cases presented in the accident and emergency department of the hospital medical college and various medicolegal formalities to be followed while dealing of such cases. The present study was conducted at Clinical forensic Medicine Unit (CFMU) of the Rural Hospital of MGIMS, Sewagram. This unit is working under department of Forensic medicine and is situated at accident and emergency department of the hospital. The study only included burn cases which are reported live. In this study total 103 cases of burn injuries are observed during the period of one year. Out of these total 103 cases of 56(54.36%) were male and 47(45.63%) were female patient. Most commonly involved age group was 21-30 years. Among the various etiological type of burn injury, Flame burn was the most common type of burn injuries. Among the flame burn injuries involvement of female patient are more than male. Married female were more commonly involved than married males.

**Keyword:** Burn Injuries; CFMU; Medicolegal Formalities.

## Introduction

Burns constitute a major public health problem, especially in low and middle income countries where in majority of the cases burn deaths occur. Fire related burns alone account for over 3 lakh deaths per year. However, deaths are not only part of the problem, for every person who dies as a result of their burns; many more are left with lifelong disabilities and disfigurements. For some this means living with the stigma and rejection that all too often comes with disability and disfigurement. Present study includes live cases of burn injuries brought at clinical forensic medicine unit of MGIMS, Sewagram. This unit is situated at accident and emergency department of the hospital of the MGIMS, Sewagram. CFMU in accident and emergency department look for all medico-legal formalities of the medico-legal cases brought in the Hospital. This unit is manned by postgraduate Student posted in department of Forensic medicine under the supervision of the forensic medicine consultant.

*Aims and Objectives*

- To study to the profile of burn injury cases brought to CFMU of Medical College.
- To study the various medicolegal formalities done while dealing with these cases.

## Material and Methods

This study is cross sectional study and conducted at Clinical Forensic Medicine Unit (CFMU) of Hospital of Medical College. Burn cases are selected from the various medico legal cases registered at CFMU during the rotational duty of the corresponding author over the period of one year. The cases which are not reported during the rotational duty of corresponding author are excluded from this study. CFMU is situated at casualty

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(accident and emergency department) of Hospital. At this Hospital whenever a patient comes to casualty, Casualty medical officer examine the patient and if he feels that the case needs medico-legal formalities then he inform it to CFMU. After that the duty doctor at CFMU examines the patient along with treating doctor as a part of team.

He note down demographic details and history of the incidence, he examines the patient and do needful medicolegal formalities like informing the police, making Forensic Medical Reports i.e. injury report, collecting needful sample after taking valid consent etc.

In the present study, information regarding the demographic details of the victim like age, sex, marital status, religion, domicile, time and place of incident were gathered by interviewing the patient or patient's attendants (parents, guardian, relatives, friends, etc.). Finding like type of burn injury, whether patient fit for statement, age of the injury, causative object / evidence of combustible material, severity of injury etc. are the various medicolegal opinion given after examination of the patient.

In Burns cases, as per the causes, the cases are categorized into scalds, flame, electricity, and lightening. Standard medicolegal literature was followed to identify the cause of burn [1].

The percentage of Total body surface area involved is calculated by the "Rule of Nine". According to this rule, the head and neck, front of chest, back of chest, front of abdomen, back of abdomen, right upper limb, left upper limb, front of left lower limb, back of left lower limb, front of right lower limb, back of right lower limb, each of which constitute 9% of the whole body area and pudendal area constitute 1% of the whole body area. In case of children the total body surface area is calculated as, head and neck 15%, front of trunk 20%, back of trunk 20%, upper limbs 20%, lower limbs 20% and genitalia 0-10% of total body surface area. For small burns of irregular outline in adults the burn is compared to the palm of victim's hand which approximates 1% of total body surface area [1].

*Findings*

## Observation and Result

In the present study maximum number of victims 42(40.77%) were in the age group of 21-30 years, followed by 30 (29.12%) cases in the age group of 31-40 years. Males 56(54.36 %) outnumbered the females 47(45.63%) cases.

In present study out of total 103 cases 53(51.45%) are from rural area and 50(48.54%) from urban area.

Out of 103 cases of burns, 72(69.90%) cases had < 25% burns followed by 13(12.65%) cases having 26-50% burn, 12(11.65%) cases having 51-75% burns and 6 (5.82%) having > 75% burns In the present study out of 103 cases maximum 47(45.63%) burn cases are due to flame burn injury, followed by 30 (29.12%) cases are due to scald burn, 25(29.12%) cases are due to electrocution and 1(0.97%) case of lightning is present. Out of these various cases female sex is predominantly involved in flame burn cases i.e. 33 (70%) out of 47 cases, while male sex predominance is seen in scald burn and electrocution cases.

Out of 103 burn cases 73(70.87%) were married and 30(29.12%) cases were unmarried. Of the 47 females, 38(80.85%) were married and 9(19.14%) unmarried in contrast to 56 males, 35(62.2%) married and 21(37.5%) unmarried.

Out of 103 Burn cases in 40(38.83%) Cases hair had been preserved for chemical analysis and in 63 (61.15%) cases it was not preserved similarly cloth has been preserved in 41(39%) cases out of total 103 cases.

Police information was done in all burn cases (100%) which were reported to CFMU.

**Table 1:** Distribution of burn cases according to age and sex (N=103)

| Age In Years | Male | Female | Total (%) |
|---|---|---|---|
| <10 | 3 | 3 | 06 (5.58%) |
| 11-20 | 4 | 2 | 06 (5.58%) |
| 21-30 | 25 | 17 | 42 (40.77%) |
| 31-40 | 18 | 12 | 30(29.12%) |
| 41-50 | 6 | 6 | 12 (11.65%) |
| 51-60 | 0 | 1 | 1 (0.97%) |
| >60 | 0 | 6 | |
| Total | 56 (54.36 %) | 47 (45.63%) | 103 (100%) |

**Table 2:** Distribution of burn cases according to the urban / rural pattern (N= 103)

| Type of Medico-legal case | Urban | Rural | Total |
|---|---|---|---|
| Burn | 50 (48.54%) | 53 (51.45%) | 103 |

**Table 3:** Distribution of burn cases according to percentage of burns (N=103)

| % of Burn | Number of cases | Percentage |
|---|---|---|
| Up to 25 | 72 | 69.90% |
| 26-50 | 12 | 11.65% |
| 51-75 | 13 | 12.62% |
| >75 | 6 | 5.82% |
| Total | 103 | 100% |

**Table 4:** Distribution of various type burn cases according to sex (N=103)

| Type of Burn | Male | Female | Total Number of cases |
|---|---|---|---|
| Electric | 20 | 5 | 25 |
| Flame | 14 | 33 | 47 |
| Lightning | 0 | 1 | 1 |
| Scald | 22 | 8 | 30 |
| Total | 56 | 47 | 103 |

**Table 5:** Distribution of burn cases according to marital status (N=103)

| Marital Status | Male | Female | Total |
|---|---|---|---|
| Married | 35 | 38 | 73 (70.87%) |
| Unmarried | 21 | 9 | 30 (29.12%) |
| Total | 56 | 47 | 103 |

**Table 6:** Various sample of medicolegal importance in burn cases preserved at CFMU

| Sample | Preserved | Not Preserved | Total |
|---|---|---|---|
| Hair for C. A. | 40 | 63 | 103 |
| Burnt Clothes | 41 | 62 | 103 |

**Table 7:** Various documentation done and sample preserved in burn cases

| Documents | Done | Not done | Total |
|---|---|---|---|
| Police Information | 103 | 0 | 103 |
| Injury Report | 103 | 0 | 103 |

## Discussion

Maximum number 42(40.77%) cases were seen in the age group of 21-30 years, followed by 30(29.12%) cases in 31-40 years age group. It was found that 70% victims were between 21-40 years. Our results are similar to the result of study conducted by Jaiswal AK et al.[2]

Reason behind this could be that this age group is a productive age, more active, and they are generally exposed to hazardous situations both at home and work. Female in this age group more succumbed to burn injury as the contact with fire is more common in female due to cooking related activity. And male are exposed to burn due to his work related activity like industrial work (e.g. exposure to hot steam, boiling liquid), electric work etc.

In the present study, out of total 103 cases majority of burn victims 56(54.36%) were males. This result is similar to the results of the studies conducted by Haberal et al [3], Gupta M et al [4], and Aida AFA et al [5], However, our result is not consistent with the results of Ravi KE et al [6], Kumar P et al [7], Mago V et al [8], Jaiswal AK et al [2], Ghaffer UB et al [9], and Shanmughkrishnan et al [10], where maximum numbers of victims were females.

Involvement of female is less in our study but the results of our study suggests significant contribution of female victims in burn cases i.e. 45.63%. Reason behind this could be due to female's close proximity to fire throughout the day and night which makes female more prone for burn injury. Overall male predominance may be due to our study contains significant number of burn cases due to electrocution which involves maximum number of male victim, and male are predominantly involved in electricity related job and hence more succumbed to such injuries. However considering the flame burn female involvement is more.

In case of Burns, out of 103 cases, maximum numbers 53 (51.45%) cases were from rural areas and 50 (48.54%) from urban areas. Our results are similar with the result of the study conducted by Jaiswal AK et al [2], this could be due to the traditional household practice of cooking in rural area, large scale use of unsafe stoves and use of kerosene as a fuel for cooking and lightning lamp, lack of safety system and the prevailing socio-cultural determinant.

As per as percentage of burn is concerned 72 (69.90%) cases had £ 25 % TBSA (total body surface area) burns, 12(11.65%) cases had 26-50% burns, 13

(12.62%) cases had 51-75 % burns and 06(5.82%) had burns more than 75%. This result is similar to the results of the study conducted by Ghaffer UB et al. [9] However, our result is not consistent with the results of the study conducted by Ravi KE et al,[6] Kumar P. et al [7], and Shanmugakrishnan RR et al,[10] where the involvement of total body surface area was more common in between 25-50%.

In our study we have included all the cases of burn reported to casualty department irrespective the severity of the case. Assessment of the percentage of burn is required to determine the severity of the wound.

Considering the type of burns out of 103 cases maximum 47(45.63%) burn cases are due to flame burn, followed by 30(29.12%) cases are due to scald burn, 25(29.12%) cases are due to electrocution and 1(0.97%) case of lightning is present. Our results are similar with the studies conducted by Haberal M et al. [3] Gupta M et al [4], kumar P et al [7], Aida AFA et al [5], Mago V et al [8], where in all these studies flame burn is most common cause of the burn injuries.

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. Female are most commonly involved in flame burn injury than males as they are more involved in cooking activities and have direct contact with fire with most of the times. Scalds can be caused by heating water too high for bathing purpose. It often results due overturn hot liquids in pans, bowls, and cups and are more likely to cause burn. Scald burn also observed among the industrial worker, due to exposure of hot liquid or steam and also among food industry worker. Another common cause of burn injury was the electrocution which was more common in male individual and main reason behind this lack of safety precaution while doing electric work.

Opinion regarding the cause of burn is important for the purpose of the investigation, as there are the instances, where judiciary has given benefit of doubt to the accused, when medical evidences was unable to prove conclusively the type of burn, i.e. whether flame / scald and hence we included it in our forensic medicine injury report as part of opinion column.

Among the victims of burns, 73(70.87%) were married and 30(29.12%) unmarried. Among 47 females, 38(80.85%) were married and 9(19.14%) were unmarried and in contrast to 56 males, 35(62.5%) married and 21(37.5%) were unmarried. As per our study married females are more commonly involved than married males. Our results are consistent with the studies conducted by Ghaffer UB et al [9], where 72.5% burn victim were married and female outnumbers the male victims.

Reason behind this could be due to increasing familial stress, day to day problem like jobs, family disputes, cooking activities etc. and hurrying through in an overcrowded room with minimal amenities inviting frequent accidents commonly among married people and mostly in female.

Sample preservation like burnt hair and clothes are necessary as they can be analysed chemically for detection of the combustible material and hence has strong role in investigation. Police usually ask for these samples. In our study out of 103 Burn cases in 40(38.83%) Cases hair had been preserved for chemical analysis and in 63(61.15%) cases it was not preserved similarly cloth has been preserved in 41(39%) cases out of total 103 cases. This suggests that CFMU is very well assisting the investigating authority for collection of the evidence.

Police information was done in all burn cases (100%) which were reported to CFMU.

## Conclusions

In case of burns male outnumbered females with the ratio of 1.19: 1. Maximum numbers were reported between the age group of 21-30 years. Victims of flame burns were more followed by scalds burns and electrocution. And it also shows involvement of the female is significant.

Among the flame burn injury female with 33(70.21%) cases outnumbers the male with 14 (29.78%) cases. While in case of electrocution and scald male are more commonly involved.

Married females are more commonly involved in burn injury than married males.

Clothes and hairs were preserved for further investigation by police agencyin maximum number of cases. This suggests that CFMU manned by forensic expert can very well assist the investigating authority for collection of the evidence in particular medicolegal case; hence quality medicolegal work can be done at Medical college level.

Medicolegal reports done at CFMU are complete and reliable as expert are involved and opinion regarding cause of burn and combustible material is also involved in the report.

Police information was done in 100% cases of burns.

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*Ethical Clearance*

Ethical clearance for the present study was obtained from the institutional Ethical Committee. MGIMS, Sewagram.

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*Conflict of Interest* - Nil

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