

Profile of Burn Patients in a Tertiary Care Hospital in India

Rahul Anand*, Indraneel Dasgupta**, Subhendu Das***, Neha Singh*

Abstract

Background: Burn trauma is one of the common problems seen in emergency department in tertiary care hospitals of Kolkata. Very few papers has been published in India regarding burn trauma, where as Burn trauma is quite frequent in India. Incidences vary from region to region and among different socio-economic groups. It has been observed that proper care of burn patient often hampered due to lack of infrastructure, trained professionals etc. In India there are very few hospitals with separate burn units, hence most of the burn patients are being managed by staff without any proper training in burn care. **Aims and Objectives:** To identify demographic and socio-cultural factors, type, modes, causes and risk factors for burn injuries and their age and gender-wise association. **Material and Method:** It was a retrospective study done on all burn patients presenting to the emergency department of Peerless Hospital and B. K. Roy Research Center from January 2014 to December 2015. The data was collected from the hospital records section. A total of eleven parameters were recorded on excel sheet and then analyzed by the statistician. **Result:** Total 56 burn patients presented during my study period. Among them 25% had first degree burn, 19.64% had second degree burn and 55.36% had third degree burn. The mode of burn was found to be Thermal in 80.36% patients, Chemical burn in 5.36% and Electrical burn 14.29%. The mechanism of burn was accidental in 98.21% and suicidal in 1.79%. No micro-organism was isolated in 96.43% of the patients. 82.14% patients received surgical management whereas 17.86% were managed conservatively. Among the total 56 patients 50% were discharged home whereas 32.14% left against medical advice (LAMA). Death occurred in 17.86% of patients. **Conclusion:** Majority of the burns occur in female population with peak age between 26 to 40 years. The highest incidence occurred due to accidental thermal injury. An education program is needed to make the population aware of various etiological factors causing burns and their prevention. Safer means and practices should be adopted in kitchen. Local health care facility should play a major and proactive role in managing burns.

Keywords: Burn; Thermal; Accidental; Female; Prevention.

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Introduction

Fire was perhaps, man's first double-edged sword, for throughout history, it has served as well destroyed mankind. Burns have tremendous medico legal importance as they may be considered to be the commonest cause of unnatural deaths in India. Often, the circumstances of burns are enveloped in mystery, obscurity and unreliable statements. The reason

behind this action may be personal, domestic, occupational or social tragedy and dowry death.

Despite of many medical advances, burns continue to remain a challenging problem. Due to the lack of infrastructure, trained professionals as well as increased cost of treatment, all of which have an impact on the outcome. Burn trauma is quite frequent in India with 0.7 to 0.8 million hospital admission every year. Incidences vary from region to region and

among different socio-economic groups. In India there are very few hospitals with separate burn units, hence most of the burn patients are being managed by staff without any proper training in burn care.

Injuries generally have continued to attract the attention of researchers all over the world. Burn injuries rank among the most severe types of injuries suffered by the human body with high mortality and morbidity rate[1]. Burns constitute a major public health problem globally, especially in low and middle income countries where over 95% of all burn deaths occur. Fire related burns alone account for over 300,000 deaths per year [2]. Burn deaths are classified among the 15 leading cause of deaths in India. Microbial infection after burns, where a large portion of the skin is damaged, is a very serious complication that often results in the death of the patients. About 45% of the mortality in burns patients is caused by septicemia[3]. Hence, this study was planned with a purpose to know the magnitude and the socio-cultural factors of the problem of burns, so that a sound prevention program could be suggested, planned, and implemented for reducing the incidence of fatal burns.

Material and Method

Study Design

A retrospective study was conducted on patients who presented with burn injury in the Emergency department of Peerless Hospital and B. K. Roy Research Center, during January 2014 and December 2015. All patients meeting the inclusion criteria were included in the study. The gathered data was entered into the excel sheet and analysis of the data was done by the statistician.

Study Sample

The retrospective study was conducted on 56 burn patients who presented to the emergency department of Peerless Hospital, Kolkata from January 2014 to December 2015.

Methodology

Retrospective research often requires the analysis of data that were originally collected for reasons other than research (Hess, 2004; Jansen et al., 2005). This includes physician and nursing notes, ambulatory and emergency room reports, consultations, admission and discharge documentation, laboratory and diagnostic testing reports, and other clinical or

administrative data.

This study was confined to the burn patients who presented to the emergency department of Peerless Hospital, Kolkata from January 2014 to December 2015 meeting the inclusion criteria. The various parameters that were recorded were: Hospital Id, Age, Sex, Month of presentation to the emergency department, Percentage of total body surface area, Depth of burn, Site of burn, Mode (thermal/electrical/chemical), Mechanism (Accidental/Suicidal/Homicidal), Antibiotics administered, Treatment (Conservative/Surgical), Micro-organism isolated, Outcome (Discharged/ LAMA/ Death). These data were put on an excel sheet and given to the statistician for analysis.

Result

Total number of subjects meeting the inclusion criteria in this study was 56.

Important Results

Quarterly Case Distribution

Table 1:

| Time | Count | Percentage |
|------|-------|------------|
| Q1 | 18 | 32.14% |
| Q2 | 6 | 10.71% |
| Q3 | 18 | 32.14% |
| Q4 | 14 | 25.00% |

Quarterly Case Distribution

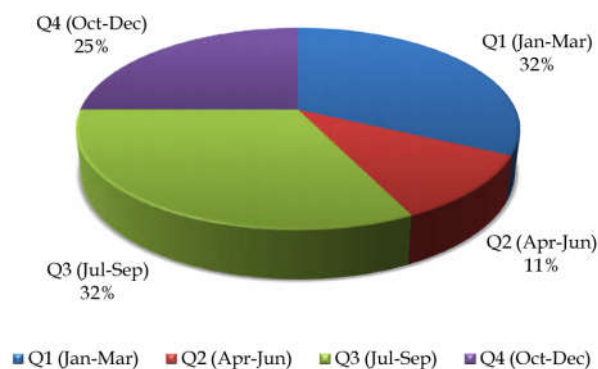


Fig. 1

Figure 1 shows that maximum burn cases(32%) presented between the months of January to March and between July to September. Least burn cases (11%)were seen between April to June.

Age Distribution

Table 2:

| Age Group | Count | Percentage |
|-----------|-------|------------|
| Up to 10 | 4 | 7.14% |
| 11 to 25 | 8 | 14.29% |
| 26 to 40 | 17 | 30.36% |
| 41 to 60 | 14 | 25.00% |
| Above 60 | 13 | 23.21% |

Average age = 41.93 years

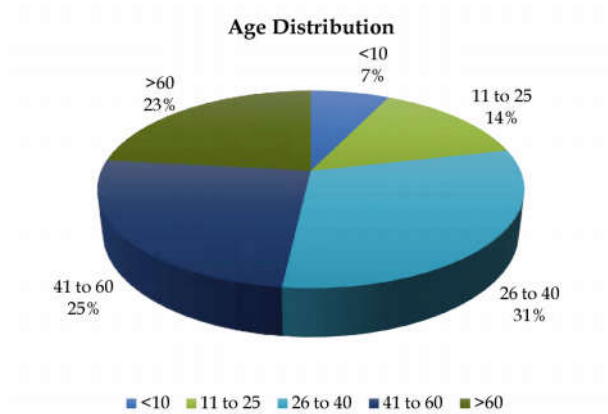


Fig. 2:

Figure 2 shows that maximum burns occurred in the age group of 26 to 40 years (31%) whereas only 7% burns presented in less than 10 years of age.

Gender Distribution

Table 3:

| Gender | Count | Percentage |
|--------|-------|------------|
| Male | 19 | 33.93% |
| Female | 37 | 66.07% |

Average %TBSA = 31%

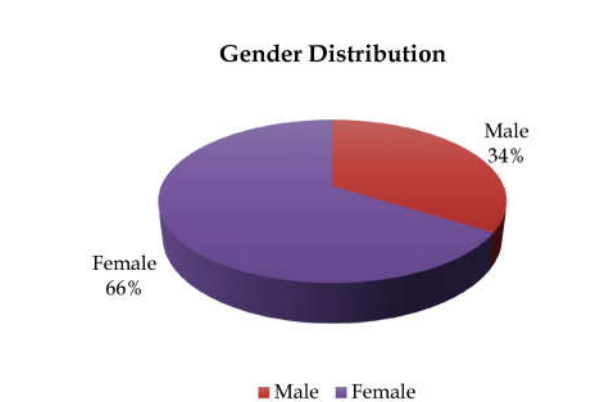


Figure 3 shows that 66% females suffered from burn injury whereas the percentage of males was 34%.

Depth Distribution

Table 4:

| Depth | Count | Percentage |
|------------|-------|------------|
| 1st Degree | 14 | 25.00% |
| 2nd Degree | 11 | 19.64% |
| 3rd Degree | 31 | 55.36% |

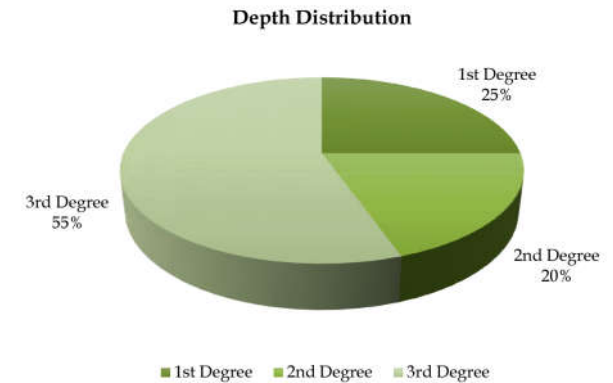


Fig. 4

Figure 4 shows the depth distribution of burns. It was found that 55% of the patients had third degree burn followed by 25% who had first degree burn and 20% had second degree burns.

Mode Distribution

Table 5:

| Mode | Count | Percentage |
|------------|-------|------------|
| Thermal | 45 | 80.36% |
| Chemical | 3 | 5.36% |
| Electrical | 8 | 14.29% |



Fig. 5:

Figure 5 shows the mode distribution of burns. The most common mode was found to be thermal with 81% distribution followed by 14% electrical burn and only 5% chemical burns.

Mechanism Distribution

Table 6:

| Mechanism | Count | Percentage |
|------------|-------|------------|
| Accidental | 55 | 98.21% |
| Suicidal | 1 | 1.79% |



Fig. 6

Figure 6 shows that 98% of the burns were accidental and 2% suicidal.

Micro-Organism Distribution

Table 7:

| Micro-organism found | Count | Percentage |
|----------------------|-------|------------|
| Yes | 2 | 3.57% |
| No | 54 | 96.43% |

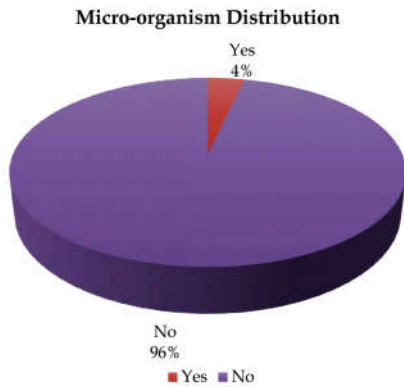


Fig. 7

Figure 7 shows that in 96% of the burn patients no micro-organisms were isolated from the cultures. In 4% cases cultures were positive for micro-organisms.

Treatment Distribution

Table 8:

| Treatment | Count | Percentage |
|--------------|-------|------------|
| Surgical | 46 | 82.14% |
| Conservative | 10 | 17.86% |

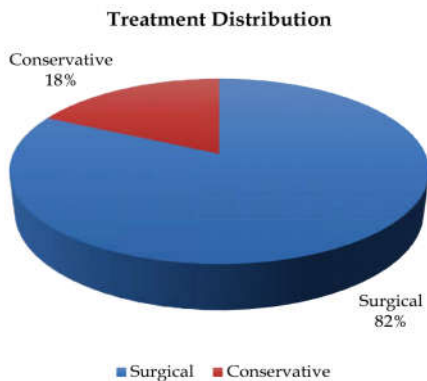


Fig. 8

Figure 8 shows the treatment given in the burn patients. 82% received surgical management whereas 18% were managed conservatively.

Outcome Distribution

Table 9

| Outcome | Count | Percentage |
|------------|-------|------------|
| Discharged | 28 | 50.00% |
| LAMA | 18 | 32.14% |
| Death | 10 | 17.86% |

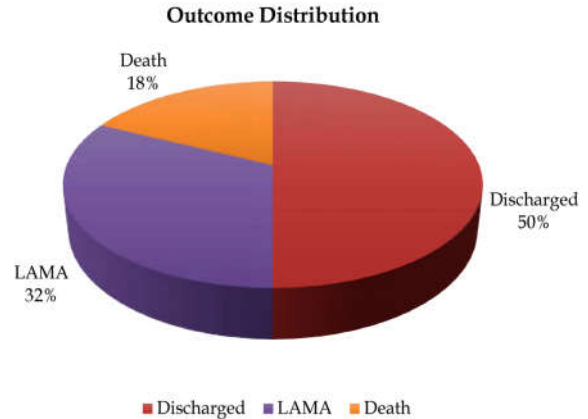


Fig. 9:

Figure 9 shows the outcome distribution of all the burn patients. It was seen that 50% of the patients were discharged from the hospital. 32% took leave against medical advice whereas death was reported in 18% of the patients.

Relation with %TBSA to Outcome

Table 10:

| %TBSA | Outcome |
|-------|------------|
| 66% | Death |
| 21% | Discharged |
| 30% | LAMA |

(Note: %TBSA is expressed as Mean of the sample data)

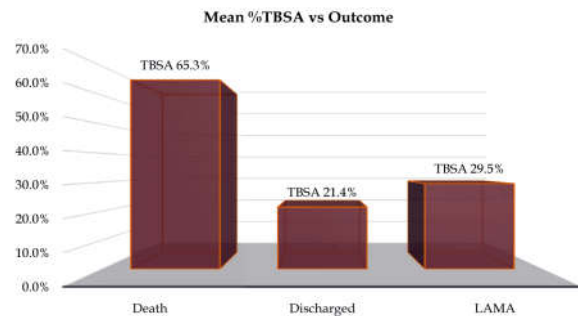


Fig. 10

Figure 10 shows relation between the total body surface area involved due to burn and outcome. It is seen that total body surface area when more than 66% resulted in death. Total body surface area involvement up to 21% were discharged. Leave against medical advice was taken in patients who had 30% total body surface area involved.

Probabilistic Occurrence of Outcome w.r.t Depth

Table 11:

| Outcome | Degree | Probability |
|------------|--------|-------------|
| Death | 1st ° | 2% |
| | 3rd ° | 16% |
| Discharged | 1st ° | 20% |
| | 2nd ° | 13% |
| | 3rd ° | 18% |
| LAMA | 1st ° | 4% |
| | 2nd ° | 7% |
| | 3rd ° | 21% |

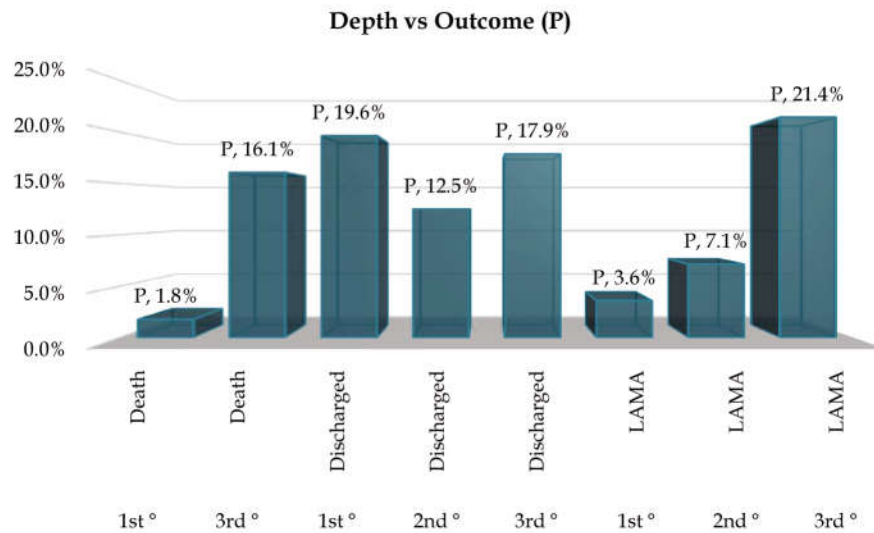


Fig. 11

Figure 11 shows the relation of the depth of burn with its outcome. It was seen that among the patients who died 16% had third degree burns. Among the discharged patients, 20% had first degree burns, 18% had third degree burns and the least was 13% with second degree burns. Leave against medical advice was taken in 21% patients with third degree burns, in 7% patients with second degree burns and in 4% patients with first degree burns

Probabilistic Occurrence of Outcome w.r.t Mode of Injury

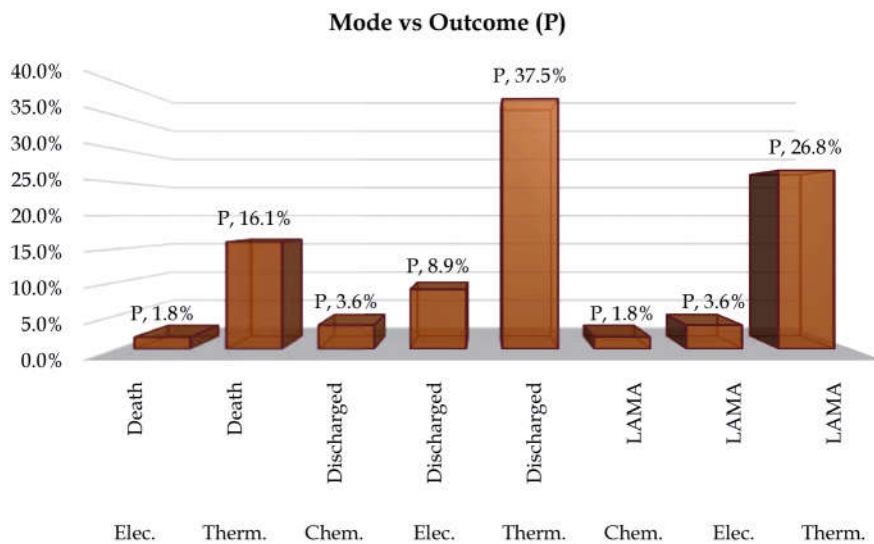


Fig. 12:

Figure 12 shows the relation between the mode of burn and outcome of the patient. In thermal burns, 37.5% were discharged, 16.1% died and 26.8% left against medical advice. In electrical burns, 8.9% were discharged, 1.8% died and 3.6% left against medical advice. Out of all chemical burn patients, 3.6% were discharged and 1.8% left against medical advice. No deaths were reported.

Table 12:

| Outcome | Mode of Injury | Probability |
|------------|----------------|-------------|
| Death | Electrical | 1.8% |
| | Thermal | 16.1% |
| Discharged | Chemical | 3.6% |
| | Electrical | 8.9% |
| | Thermal | 37.5% |
| LAMA | Chemical | 1.8% |
| | Electrical | 3.6% |
| | Thermal | 26.8% |

Discussion

Our study was a retrospective study done on all burn patients who presented to the emergency department of Peerless Hospital and B. K. Roy Research Centre, Kolkata. Total of 56 patients were included in this study. The primary objective of the study was to identify demographic and socio-cultural factors, type, modes, causes and risk factors for burn injuries and their gender-wise association presented to a tertiary care hospital in Kolkata in a specific time period (Peerless Hospital and B. K. Roy Research Centre, Kolkata from January'2014 to December'2015).

In our study we found that the most common age group presenting with burns was between 26 to 40 years. 30.36% of total burn patients were in this age group. Next most susceptible group was between 41 to 60 years which had 25% of the burn patients. 23.21% of burn patients were the elderly i.e. greater than 60 years of age. 14.29% patients were in the age group of 11 to 25 years. Relatively small percentage of 7.14% of the burn patients were in the age group of less than 10 years.

Females outweighed males in our study. Among the total burn patients studied, 66.07% were females whereas 33.93% were males. This observation is particularly important owing to the increased dowry deaths in India. This data directly correlates with previous studies conducted in Punjab, SGM Hospital, Rewa.

The most common mode of burn was found to be thermal with 80.36% falling in this category. The second most common mode was electrical being 14.29%. The least common mode of burn was by chemicals accounting for 5.36%. This data directly correlates with previous studies done from Punjab, Rewa and Tuscon. Women in the age group between 26 years to 40 years are mostly engaged in cooking and wear loose fitting clothes like Saree, dupatta etc which catch fire easily.

It was found that majority of burns were accidental, percentage being 98.21% whereas 1.79% were due to

suicide. No cases of homicide were reported.

There was a seasonal distribution of the burn patients seen in this study. 32.14% cases occurred from January to March and also between July to September. Least cases were reported from April to June (10.71%).

Majority of the patients who presented after burn injury had third degree burns (55.36%). 25% had first degree burn and 19.64% had second degree burns which was the least.

Burn patients either require surgical treatment or are managed conservatively depending on their depth of burns. In our study we found that 82.14% of the patients required surgical treatment. 17.8% were managed conservatively that included antibiotics and fluids.

It was found that in 96.43% patients no micro-organism was isolated. In 3.57% of the patients cultures were positive for micro-organisms.

The analysis of all the 56 burn patients showed that 50% of the patients were discharged whereas 32.14% patients left against medical advice. Death was reported in 17.86% patients. With this result it is particularly important to identify the high risk groups for sustaining burn injury, to make the society aware and strengthen health care facilities for early and aggressive management of burn patients. We also need to implement measures to prevent burn injuries.

After the analysis of the individual parameters, a probabilistic testing was done between the different parameters and its outcome. The probabilistic occurrence of the mode of burn versus outcome showed that thermal injuries resulted in 16.1% deaths whereas electrical injuries resulted in 1.8% deaths. No deaths occurred due to chemical burns. 37.5% thermal burn patients were discharged home. The percentage of patients discharged in electrical and chemical burns were 8.9% and 3.6% respectively. This analysis explains the high risk of complications leading to death in thermal burns.

The next probabilistic testing was done between depths of burn versus outcome. Death occurred in 16% patients who had third degree burns. 18% patients with third degree burn were discharged home whereas 21% patients left against medical advice. In second degree burns 13% were discharged and 7% left against medical advice. No deaths were reported. In first degree burns 20% were discharged home and 4% left against medical advice. 2% deaths were reported in first degree burns. With this we found that third degree burns led to a worse outcome i.e. death when compared to first and second degree.

A probabilistic testing was next done between the total body surface area involved versus outcome. It was found that the worse outcome i.e. death was reported when the total body surface area was greater than 66%. Total body surface area involvement of up to 21% were discharged home whereas involvements up to 30% took leave against medical advice. This suggests a grave prognosis if the initial body surface area involved in burn is greater than 66%.

We also tried to study the inter-relationships between factors and the nature and extent of relationships, if any.

Firstly we tried to find out whether the factors *Gender and depth (Degree of Burn)* independent?

For this we performed a Chi - square test of independence on the two factors (variables). The p value for this test resulted to be 0.339. This p value was much higher than our pre-decided level of acceptance of 0.05 thus rendering it to be statistically insignificant. This led us to conclude that the two factors of Gender and Burn depth were likely to be independent.

We also studied any correlational (Correlation refers to any of a broad class of statistical relationships involving dependence. Commonly, it refers to the extent to which two variables have a linear relationship with each other) variation amongst the notable variables.

Since we needed a quantitative value in order to progress with statistical analysis we have assigned the value 2 to the outcome column in cases where the outcome was death, 1 for LAMA and the value 0 otherwise (higher number indicating the likely severity of outcome). The results were as follows -

| | |
|---------------------------------|-------|
| Age vs. %TBSA (correlation) | 0.133 |
| Age vs. Outcome (correlation) | 0.255 |
| %TBSA vs. Outcome (correlation) | 0.711 |

From the values we can see that there isn't much of a linear relationship between the Age of the patient and %TBSA observed. The results are similar between the variables of Age and the final Outcome as well, since they also showed very little linear relationship.

However when we look at the correlation value between %TBSA and final Outcome, the reasonably high value of 0.711 shows that there is a good extent of linear relationship between the two variables or in other words more often than not the severity of outcome was proportional to the extent of % TBSA. However, it must be mentioned/noted that strong correlation doesn't necessarily indicate towards a causal relationship.

To explore the nature and extent of the relationship between %TBSA and Outcome we did a regression analysis on the data. Any regression equation formed on the basis of this analysis can be used in future to forecast or for predictive analysis based on availability of data some of the factors studied in this regression analysis. The results were -

The *Multiple R* or the correlation coefficient tells us how strong the linear relationship is. For example, a value of 1 means a perfect positive relationship and a value of zero means no relationship at all. The value was 0.709, which is reasonably high and showed that relationship between the variables is quite strong.

The *R squared* or r^2 , the Coefficient of Determination tells us how many points fall on the regression line. In other words, 50.29% of the values fit the model (if prepare on basis of this). Here, Significance of F =1.36007E-09, (obtained from the ANOVA test) which is very small, indicates there is a very low chance that the Regression output was merely a chance occurrence. The residual values and its plot were also prepared to obtain line fit plot which could be used for modelling purposes. However, one of the p-values being significantly high (0.877529381) indicates that further fine-tuning is required before we can arrive at an accurate forecasting model.

Conclusion

The epidemiological factors of burn injury vary in different countries. In our study we found that there are lot of variation in relation to age, sex, mode of incidence, time distribution in a year, degree of injury, outcome and epidemiology in concern. For planning and implementing prevention programs the approach have to be multi-disciplinary and coordinated and may be largely accomplished by providing immense amount of education so as to build awareness in the mind set of general population, school education programs, male concerning risk in work locations, the family especially the housewives and parents. Educating the masses through the media showing various risk factors together with epidemiological data about burn injuries and call attention to make strategies to prevent these accidents. So, as long as the problem of deaths by burn persists in India, the government needs to concentrate in this direction and the NGOs, social groups, and workers need to put in more sincere efforts. Steps should be taken not only to minimize burn mortality but also to prevent and reduce their incidence at least in cases where human error and human greed plays a role.

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