

## Validation of New Burns Score {Sion Prognostic Burns Scoring System (SPBSS)} and Its Comparison with Jabalpur Prognostic Score, Baux Score & Apache III Score

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### Abstract:

This research delves into the intricate spectrum of outcomes observed in individuals with burns injury by comparing objectives with our own score with other established scores to access prognosis. This is single centered, observational, prospective & comparative study for patients admitted at tertiary health care institute. 50 patients satisfying the inclusion exclusion criteria admitted in the burns wards of the hospital were included. In the present study 86% subjects were survived while the mortality was among 14% study subjects. We observed mortality was greater among the subjects with comparative higher SPBSS score.

**Background:** Burns are devastating injuries that can produce permanent disfigurement, physical dysfunction, psychological morbidity, and death. The estimated annual burn incidence in India is approximately 6-7 million per year. The high incidence is attributed to illiteracy, poverty and low-level safety consciousness in the population. The situation becomes further grim due to the absence of organized burn care at primary and secondary health care level more than five thousand people (18.9 per 100,000 population) are hospitalized for an average of 13 days, with a mortality rate of 4.1%. Early prediction of outcome (i.e., survival or mortality) may help triage effectively, and to implement early medical and surgical interventions efficiently. In turn, better care could reduce hospital complications, shorten length of stay, improve quality of life, and enhance survival.

**Keywords:** Burns, Observational, SPBSS, SIRS, Total Body Surface Area.

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### Introduction

Burns are a major global health problem, resulting in significant mortality, morbidity, and economic burden. Burn injuries are ranked as the fourth most common type of trauma internationally, preceded by traffic accidents, falls, and interpersonal violence. [1-3]

The burden varies significantly in accordance with socioeconomic status, with more than 90% of burn injuries and 90% of burn-related deaths occurring in low- and middle-income countries. [2-5] when assessing and evaluating the in-hospital care of burn-injured patients, the standard outcome measure is patient mortality. Mortality scoring systems attempt to predict an expected mortality rate by using the most significant patient-related risk factors in a calculation or formula. [6] Ideally, a mortality scoring system should be accurate and reproducible as well as easy to apply in a variety of settings and patient groups. Practically, it should

require only a few easily measurable input variables which are entered into a simple calculation or algorithm to provide an output estimate of predicted mortality [7]. In the past century, more than 40 new or revised mortality prediction models have been created and validated to assess mortality risks in burn populations. [1,8,9] There is a marked heterogeneity in groups of patients with burns, and it is not possible to develop an all-encompassing prognostic tool; thus, individual burn units need to recalibrate scoring systems to their own patient population. [6]

One of the most well-known and widely used burns mortality scoring systems is the Baux score. This score was originally developed in 1961 by Professor Serge Baux at Hospital Saint-Antonio, Paris, as a part of his doctoral thesis. [1,6,10,11] Baux described a simple score to predict mortality after burn injury by adding age and percentage total

body surface area (% TBSA) burned. This score gained wide international acceptance because of its simplicity and clinical applicability. [6,12] It is a useful tool when initially assessing a burn and is still being taught to doctors in training today.[12]

Many prognostic scoring systems are available for burn patients. These scoring systems allow stratification of patients according to severity, help in identification of patients at high risk and provide prognostic information. These range from simple rule of the thumb to those incorporating more sophisticated investigations and use of global scales involved in the management of patients in intensive care unit (ICU).[1-8]

ICU care and sophisticated investigations may not be available for most burn patients due to infra-structural constraints in developing countries. Additionally, any scoring system aspiring to predict risks must take into consideration geographical variations, including treatment facilities, inherent in a cohort of patients.[9]

We, therefore, felt the need for a simple prognostic scoring system, which can be used easily in developing countries. Hence the present study was conducted to compare various scores with our own score and to evaluate best score/criteria to access prognosis in burns patients.

#### Methods/Approach

**Study Design:** Single centered, Observational, Prospective and Comparative Study

**Study subjects:** Burns patient admitted at tertiary healthcare institute

**Place of study:** Dept of General Surgery, LTMMC and LTMGH, Sion, Mumbai

Proposed duration of study: From 31/12/2018 to 31/12/2020 (18 months)

#### Inclusion Criteria:

Partial / full thickness burns of all total BSA (TBSA)

Burns involving the face, hands, genitalia, perineum, or major joints

All high-voltage electrical burns, including lightning injury

Chemical burns

Inhalational burns

**Exclusion Criteria:** Patients (Relatives) not willing to get enrolled in the study.

**Sampling Method:** 50 cases fulfilling the set inclusion criteria were enrolled in the present study using ample size calculation formula:

$$(a + c) = \frac{Z^2 S(1 - S)}{d^2}$$

$$(a + b + c + d) = P(a + c)$$

Where,

- S = Guestimated Sensitivity
- d= Absolute precision (20-25% of S)
- = Set level of confidence (<1.0)
- Z= Z value associated with alpha
- a+c= Minimum total diseases positive
- P= Prevalence of disease (0-1)

The sample size was calculated as 50 for the present study.

Sampling size: 50 cases fulfilling the set inclusion criteria were enrolled in the present study using ample size calculation formula.

This was an observational study conducted at LTMMC and LTMGH, SION, MUMBAI. Approval was taken from the Institutional Ethics Committee for the study.

50 patients satisfying the inclusion-exclusion criteria admitted in the burn wards of the hospital were included in the study.

Patient admitted in burn ward through emergency were observed in terms of age, sex, percentage of burn, outcome of patient, mode of burn.

Then patients were observed for parameters as mentioned under the case proforma and co-relation was drawn between the occurrences of outcome measures and the scores under study as follows.

Prognostic indicators in this study:

#### a) Jabalpur Prognostic Score:

**Table 1:**

| Prognostic Factor           | Score   |        |         |         |         |
|-----------------------------|---------|--------|---------|---------|---------|
|                             | 1       | 2      | 3       | 4       | 5       |
| Total body surface area (A) | 1-25%   | 26-40% | 41-45%  | 46-55%  | 56-100% |
| Full thickness burn (B)     | 0-5%    | 6-9%   | 10-12%  | 13-18%  | >18%    |
| Inhalation Burn (C)         | Absent  | -      | -       | -       | Present |
| Serum Creatinine (D)        | 0.6-1.4 | -      | 1.5-1.9 | 2.0-3.4 | >3.5    |

**JPS= A+B+C+D (range =4-20), Outcome: Score Range 4 to 20, Score >12 Carries Higher Mortality Rates**

**b) Baux Score:** Baux score is a system used to predict the chance of mortality due to severe Burns.

The original Baux score was the addition of two factors, the first being the total body surface area affected by burning (usually estimated using the Wallace rule of nines, or calculated using a Lund and Browder chart) and the second being the age of the patient.

The score is expressed as:

Baux score = (percent body surface burned) + (patient's age)

The score is a comparative indicator of burn severity, with a score over 140 considered as being

unsurvivable, depending on the available treatment resources.

**Modified method:** Research demonstrated that with improvements in medical care rendered the original method too pessimistic in its outcome prediction. This resulted in the publication of a modified methodology which took into account the effect of inhalation injury. It was found that inhalation injury resulted in an increase of around 17 on the Baux score, and this addition means that a patient with inhalation injury would have their score calculated by body area affected + age of patient + 17.

**c) APACHE III Score:**

**Table 1 – Components of APACHE III-j score<sup>a</sup>.**

|                                 |
|---------------------------------|
| Age (years)                     |
| <i>Chronic conditions</i>       |
| AIDS                            |
| Hepatic failure                 |
| Lymphoma                        |
| Metastatic cancer               |
| Leukaemia/multiple myeloma      |
| Immune suppression              |
| Cirrhosis                       |
| <i>Physiological parameters</i> |
| Pulse                           |
| Mean BP                         |
| Neurological abnormalities      |
| pH                              |
| Temperature                     |
| Respiratory rate                |
| PaO <sub>2</sub>                |
| A-a gradient                    |
| Haematocrit                     |
| WBC                             |
| Creatinine                      |
| Urine output                    |
| BUN                             |
| Sodium                          |
| Albumin                         |
| Bilirubin                       |
| Glucose                         |

<sup>a</sup> A weighting is given to each variable based on its degree of variation from normal which is then used to calculate the overall score. Highest and lowest values from the first 24 h are recorded.

**Table 2:**

| Parameters                |         | Score |
|---------------------------|---------|-------|
| 1. Age (Yrs)              | <44     | 0     |
|                           | 45-54   | 2     |
|                           | 55-64   | 3     |
|                           | 65-74   | 5     |
|                           | >74     | 6     |
| 2. H/O Chronic Conditions | 5       |       |
| 3. PULSE (/min)           | >180    | 4     |
|                           | 140-180 | 3     |
|                           | 110-140 | 2     |
|                           | 70-110  | 0     |
|                           | 55-70   | 2     |
|                           | 40-55   | 3     |
|                           | <40     | 4     |
| 4. MEAN BP (mmHg)         | >159    | 4     |
|                           | 129-159 | 3     |

|  |         |   |
|--|---------|---|
|  | 109-129 | 2 |
|  | 69-109  | 0 |
|  | 49-69   | 2 |
|  | <49     | 4 |

| Parameters  |   | Score                                |
|---|---|--------------------------------------|
| 1. GCS  | 15<br>14-12<br>11-10<br><9  | 0<br>1<br>2<br>3                     |
| 2. Ph   | >7.70<br>7.60-7.70<br>7.50-7.60<br>7.33-7.50<br>7.25-7.33<br>7.15-7.25<br><7.15 | 4<br>3<br>1<br>0<br>2<br>3<br>4      |
| 3. TEMPERATURE (*C)   | >41<br>39-41<br>38.5-39<br>36-38.5<br>34-36<br>32-34<br>30-32<br><30            | 4<br>3<br>1<br>0<br>1<br>2<br>3<br>4 |
| 4. RESPIRATORY RATE (/min)  | >50<br>35-50<br>25-35<br>12-25<br>10-12<br>6-10<br><6                           | 4<br>3<br>1<br>0<br>1<br>2<br>4      |
| 5. PaO2 (mmHg)  | >70<br>61-70<br>55-60<br><55  | 0<br>1<br>3<br>4                     |
| 6. A-a gradient (mmHg) =<br>[(FiO2)*(Atmospheric pressure-H2O Pressure)-<br>(PaCO2/0.8)]-PaO2<br>where a) FiO2= 21% for room air<br>b) Atmospheric pressure =<br>760mmHg at sea level<br>c) H2O Pressure =45mmHg<br>at room level | <200<br>200-349<br>350-499<br>>499  | 0<br>2<br>3<br>4                     |

| Parameters              |  | Score                      |
|-------------------------|--|----------------------------|
| 1. Haematocrit (%)      | >60<br>50-60<br>46-50<br>30-46<br>20-30<br><20 | 4<br>2<br>1<br>0<br>2<br>4 |
| 2. TLC (/mm3 in 1000's) | >40<br>20-40<br>15-20<br>3-15<br>1-3<br><1     | 4<br>2<br>1<br>0<br>2<br>4 |

|                            |   |                                      |
|----------------------------|---|--------------------------------------|
| 3. SR.CREATININE (mg/dL)   | >3.5 with acute renal failure<br>2-3.5 with acute renal failure<br>>3.5 with chronic renal failure<br>1.5-2 with acute renal failure<br>2-3.5 with chronic renal failure<br>1.5-2 with chronic renal failure<br>0.6-1.5<br><0.6 | 8<br>6<br>4<br>4<br>3<br>2<br>0<br>2 |
| 4. Urine Output (ml/day)   | >1500<br>500-1000<br><500   | 0<br>1<br>2                          |
| 5. BUN (mg/dL)             | >21<br>7-21   | 1<br>0                               |
| 6. SR.SODIUM (mmol/L)      | >180<br>160-180<br>155-160<br>150-155<br>130-150<br>120-130<br>111-120<br><111  | 4<br>3<br>2<br>1<br>0<br>2<br>3<br>4 |
| 7. SR. ALBUMIN (g/dl)      | >3.5<br><3.5  | 0<br>1                               |
| 8. Total Bilirubin (mg/dL) | 0.3-2.0<br>2.0-15<br>>15  | 0<br>1<br>3                          |
| 9. Random Blood Sugar      | <160<br>>160  | 0<br>1                               |

**Outcome:** Approximated in hospital mortality rates

| APACHE III Score | Mortality |
|------------------|-----------|
| 0-6              | 4%        |
| 7-12             | 8%        |
| 13-18            | 15%       |
| 19-26            | 25%       |
| 27-34            | 40%       |
| 35-42            | 55%       |
| 43-50            | 73%       |
| >50              | 85%       |

**4. Sion Prognostic Burns Scoring System (SPBSS):** This will be new prognostic index which we are going to use in comparison with above indexes. This will apply to all 50 cases of all ranges of TBSA according to Wallace Rule of Nine; this will apply to admit patients.

**Table 3:**

| Sr no | Parameter                 | Reference range (Score - 0) | Score                            |         |                  |
|-------|---------------------------|-----------------------------|----------------------------------|---------|------------------|
|       |                           |                             | 1                                | 2       | -                |
| 1.    | C-Reactive Proteins (CRP) | < 10.0 mg/L                 | 10-100                           | 100-500 | -                |
| 2.    | Sr. Albumin               | 2.5 to 3.5 g/dl             | <2.5                             | -       | Score -1 if >3.5 |
| 3.    | Platelet Count            | 1.5 to 4.5 lac/UI           | <1.5                             | -       | Score -1 if >4.5 |
| 4.    | Creatinine Clearance      | 100-130 mL/min (female)     | 1 (raised values from reference) |         |                  |

|     |                                      |                       |   |   |   |
|-----|--------------------------------------|-----------------------|---|---|---|
|     |                                      | 110-150 ml/min (male) | range)                                    |   |   |
| 5.  | SpO2                                 | 95-100%               | <95%                                      | -                                       | -   |
| 6.  | Bacteremia                           | No Growth             | Any Growth                                | -                                       | -   |
| 7.  | Blood Ph                             | 7.35-7.45             | 1 (Any deviation from reference range)    |   |   |
| 8.  | TBSA                                 | -                     | 1-20%                                     | 21-50%                                  | Score 3 if >50%                                 |
| 9.  | Glasgow Coma Scale                   | 15                    | 14-12                                     | 11-10                                   | Score 3 if <9 or GCS 11-10 in intubated patient |
| 10. | Inhalation Injury                    | No Inhalation Injury  | Cord oedema, carbonaceous deposits        | Need to be Tracheostomised              | -   |
| 11  | Mean Arterial Pressure (MAP)         | 65-110 mmHg           | < 65 or 65-110 with inotropic supports    | < 65 with inotropic supports            | -   |
| 12  | International Normalized Ratio (INR) | 0.8-1.5               | > 1.5                                     | -                                       | -   |
| 13  | Alanine Aminotransferase (ALT)       | 7-56 U/L              | 10-21 times increase from reference range | >21 times increase from reference range | -   |
| 14  | Arterial Lactate                     | 0.5-2.0 mmol/L        | >2.0 mmol/L                               | --                                      | -   |
| 15  | Sr. Phosphorus                       | 2.5-4.6 mg/dl         | <2.5 mg/dl                                | -                                       | -   |

**Systemic inflammatory response syndrome (SIRS)**

**Table 4:**

| <b>Finding</b>   | <b>Value</b>                                     |
|------------------|--|
| Temperature      | <36 °C (96.8 °F) or >38 °C (100.4 °F)            |
| Heart rate       | >90/min  |
| Respiratory rate | >20/min  |
| TLC              | <4000/mm <sup>3</sup> or >12,000/mm <sup>3</sup> |

Presence of any of the above 2 criteria's of SIRS will be scored as 1 & presence of all 4 criteria's will be scored as 2.

Formulas used in above score:

1)  $MAP = 1/3SBP + 2/3DBP$

2) Cockcroft Gault Formula for Creatinine Clearance=

$[(140 - \text{Age}) * \text{Wt. in kgs} / \text{Sr.Creat.} * 72] * (0.85 \text{ for females})$

Outcome: Score Range -2 To 25

Score -2 To 8 (Grade 1)

9 to 16 (Grade 2)

17 to 25 (Grade 3)

Scores for SPBSS will be calculated on day 0, day 7, day 14

**Results**

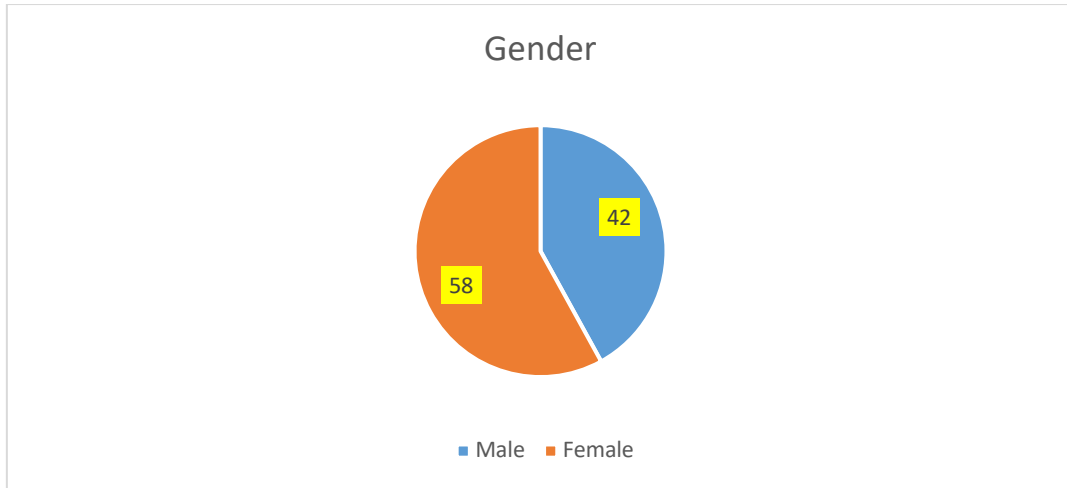
**Gender wise distribution**

In the present study we assessed the gender wise distribution among the study subjects.

We observed that majority were males (82.19%), and 17.81% were female subjects. The male: female ratio in the present study was 4.61:1.

**Table 5:**

| <b>Gender distribution</b> | <b>Number of subjects</b> | <b>Percentage</b> |
|----------------------------|---------------------------|-------------------|
| Male                       | 21                        | 42.00             |
| Female                     | 29                        | 58.00             |
| Total                      | 50                        | 100.00            |

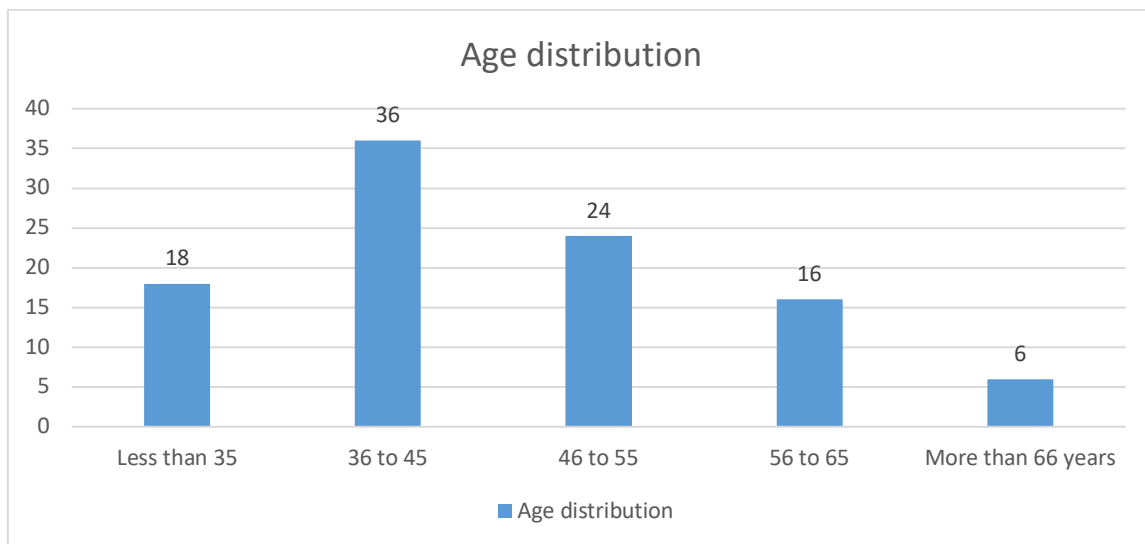


**Figure 1: Gender**

**Age distribution:** In the present study we assessed the age distribution among the study subjects. We observed that majority of the subjects belonged to 36 to 45 years (36%), followed by 46 to 55 years (24%), 36 to 45 years (36%), less than 35 years among 18% study subjects. The mean age of the study subjects was  $44.92 \pm 12.13$  years (median age 43.5 years).

**Table 6:**

| Age distribution   | Number of subjects | Percentage |
|--------------------|--------------------|------------|
| Less than 35       | 9                  | 18.00      |
| 36 to 45           | 18                 | 36.00      |
| 46 to 55           | 12                 | 24.00      |
| 56 to 65           | 8                  | 16.00      |
| More than 66 years | 3                  | 6.00       |
| Total              | 50                 | 100.00     |



**Figure 2: Age distribution**

**Total Body Surface Area:** In the present study we assessed the TSBA affected among the study subjects. We observed that among majority of the subjects 26 to 40% TSBA was affected (44%), followed by 41 to 45% TSBA (28% subjects), and 1% subjects had TSBA affected 1 to 25% and 45 to 55% each.

**Table 7:**

| TBSA     | Number of subjects | Percentage |
|----------|--------------------|------------|
| 1 to 25  | 5                  | 10.00      |
| 26 to 40 | 22                 | 44.00      |

|           |    |        |
|-----------|----|--------|
| 41 to 45  | 14 | 28.00  |
| 46 to 55  | 5  | 10.00  |
| 56 to 100 | 4  | 8.00   |
| Total     | 50 | 100.00 |

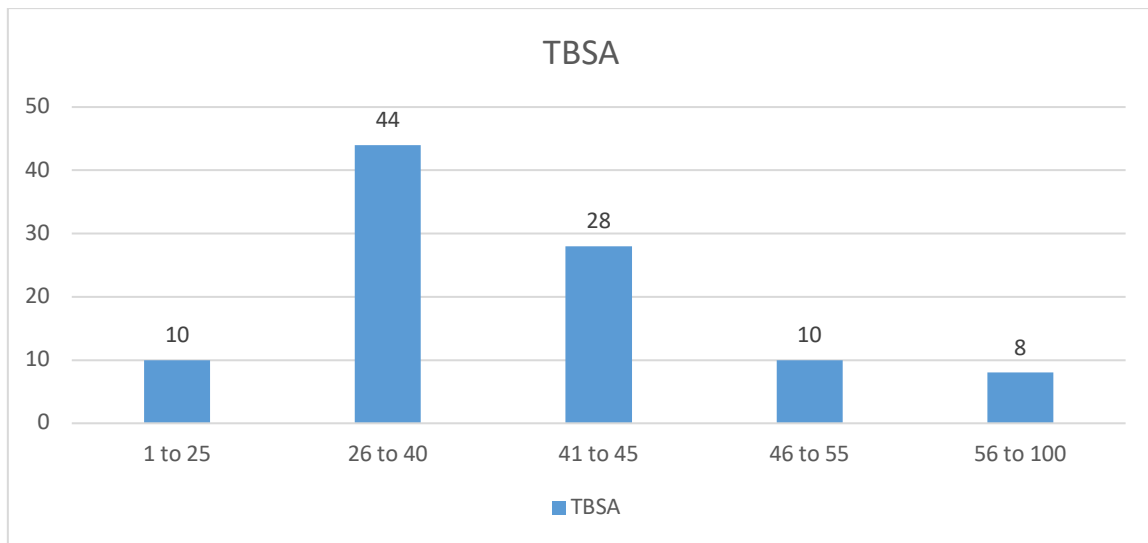


Figure 3: TBSA

**Full body burn:** In the present study we assessed the full body burn area affected among the study subjects. We observed that among majority of the subjects 6 to 9% full body burn area was affected (44%), followed by 10 to 12% full body burn area among 28% subjects, and 10% subjects had full body burn area affected 0 to 5% and 13 to 18% each.

Table 8:

| Full body burn | Number of subjects | Percentage |
|----------------|--------------------|------------|
| 0 to 5%        | 5                  | 10.00      |
| 6 to 9%        | 22                 | 44.00      |
| 10 to 12%      | 14                 | 28.00      |
| 13 to 18%      | 5                  | 10.00      |
| More than 18%  | 4                  | 8.00       |
| Total          | 50                 | 100.00     |

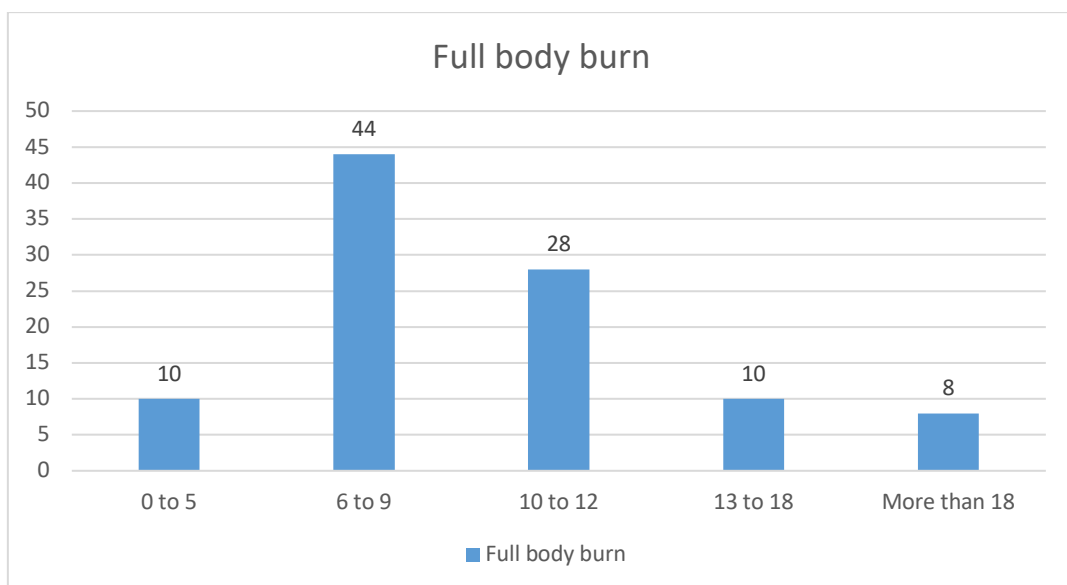


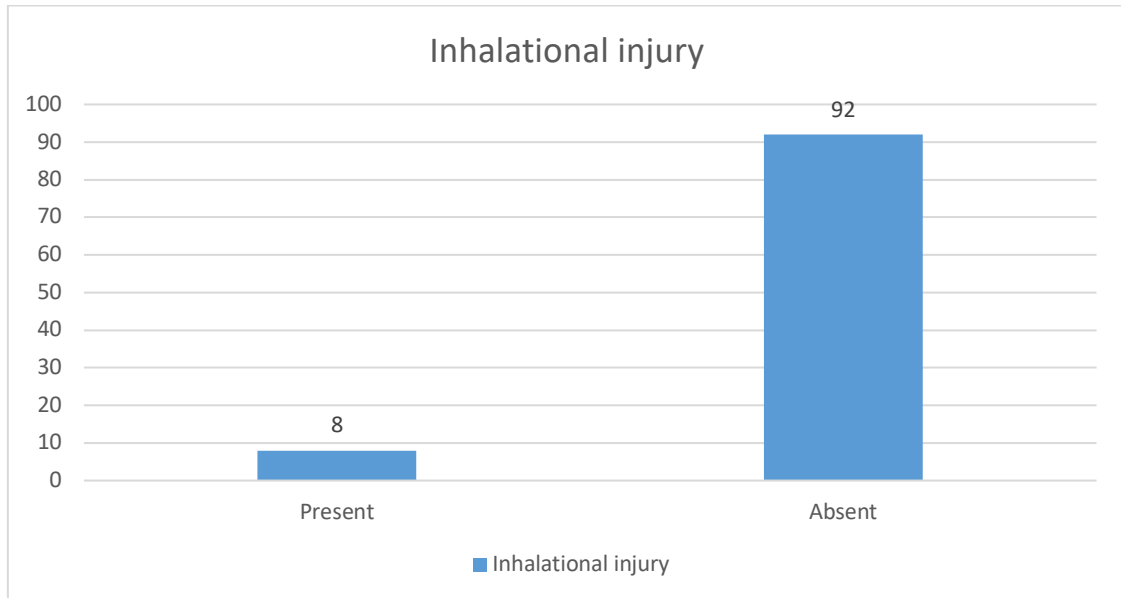
Figure 4: Full body burn



**Inhalational injury:** In the present study we assessed the presence of Inhalational injury among the study subjects. We observed that Inhalational injury was observed among 8% of the subjects while it was absent among 92% subjects.

**Table 9:**

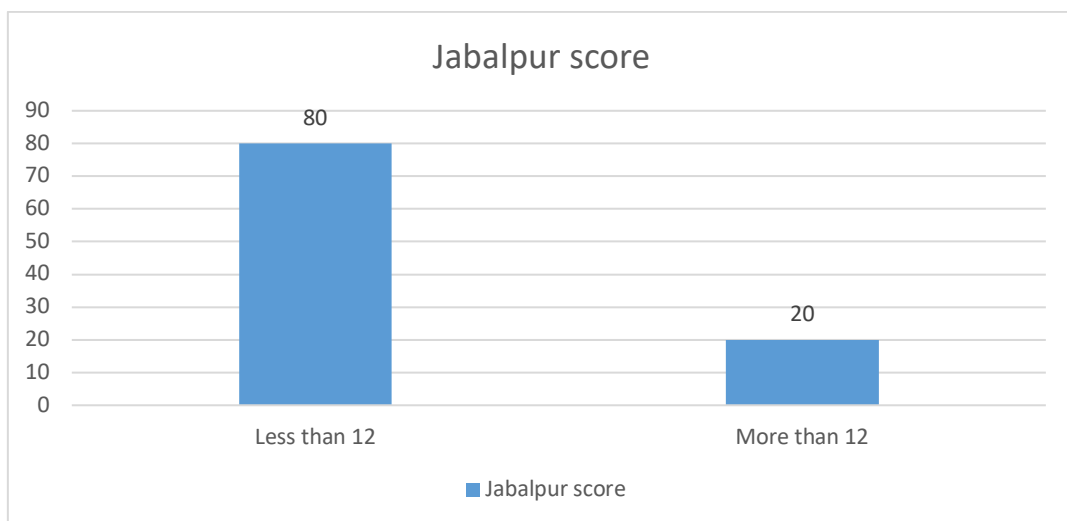
| Inhalational injury | Percentage | Percentage |
|---------------------|------------|------------|
| Present             | 4          | 8.00       |
| Absent              | 46         | 92.00      |
| Total               | 50         | 100.00     |

**Figure 5: Inhalational injury**

**Jabalpur score:** In the present study we assessed the Jabalpur score among the study subjects. We observed that majority of the subjects had score less than 12 (80), While 20% subjects had score more than 12.

**Table 10:**

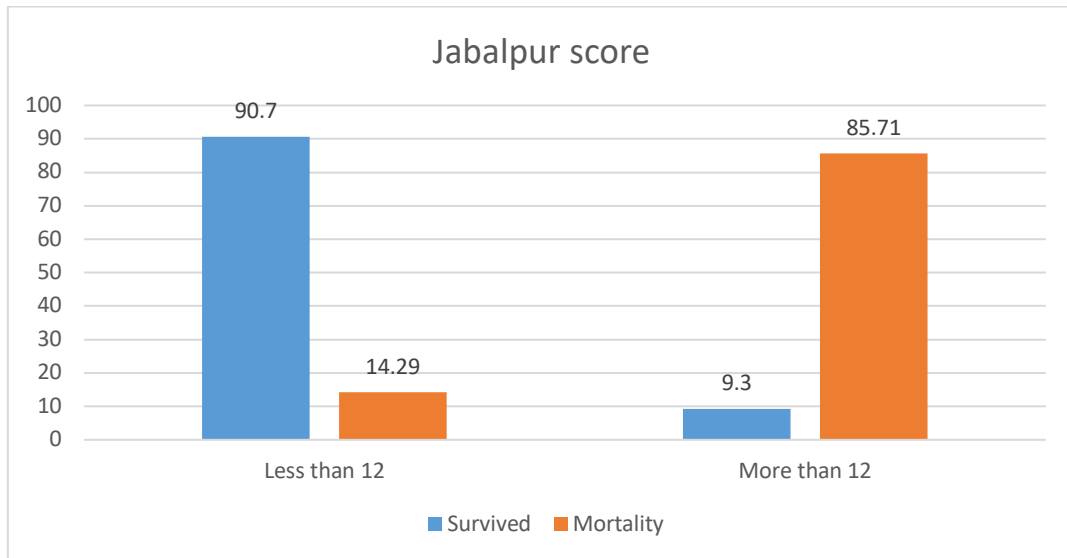
| Jabalpur score | Number of subjects | Percentage |
|----------------|--------------------|------------|
| Less than 12   | 40                 | 80         |
| More than 12   | 10                 | 20         |
| Total          | 50                 | 100        |

**Figure 6: Jabalpur Score**

**Comparison between Jabalpur Score and Outcomes:** In the present study we assessed the Jabalpur score among the study subjects. We observed that among survived subjects, all had score less than 12 (90.7%), while among expired subjects, 85.71% had less than 12.

**Table 11:**

| Score        | Survived           |            | Mortality          |            |
|--------------|--------------------|------------|--------------------|------------|
|              | Number of subjects | Percentage | Number of subjects | Percentage |
| Less than 12 | 39                 | 90.7       | 1                  | 14.29      |
| More than 12 | 4                  | 9.3        | 6                  | 85.71      |
| Total        | 43                 | 100        | 7                  | 100        |

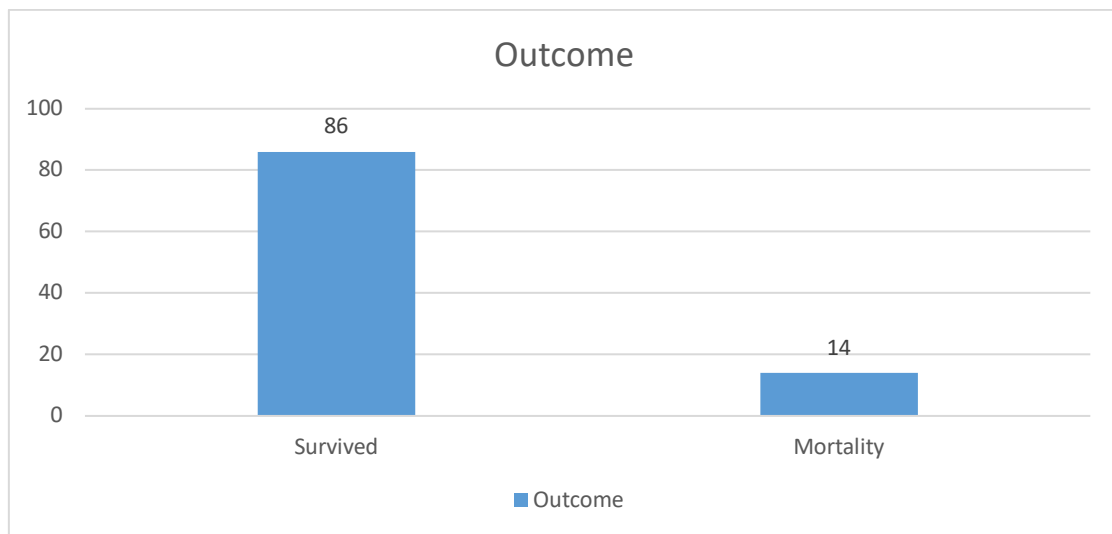


**Figure 7: Jabalpur score**

**Outcome:** In the present study we assessed the outcomes among the study subjects. We observed that 86% subjects were survived, cured and discharged, while mortality was observed among 14% study subjects.

**Table 12:**

| Outcome   | Number of subjects | Percentage |
|-----------|--------------------|------------|
| Survived  | 43                 | 86.00      |
| Mortality | 7                  | 14.00      |
| Total     | 50                 | 100.00     |



**Figure 8: Outcome**

**Comparison of Extent of Burns with Outcomes**

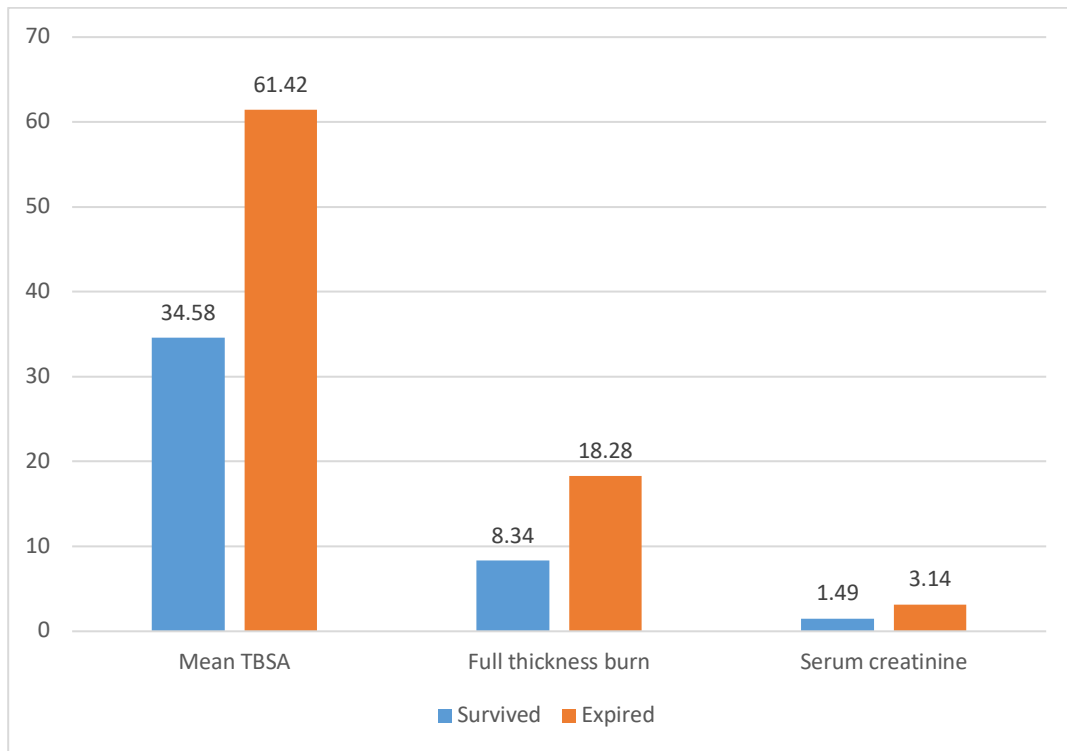
In the present study we assessed the mean TSBA, mean full thickness burn and serum creatinine levels among survived and expired subjects. We observed mean TSBA of 34.42%, mean full thickness burn 8.34%, and mean serum creatinine 1.49 among the survived subjects, while mean TSBA of 61.42% (The t-value is 6.98036. The p-

value is < .00001. The result is significant at  $p < .05$ .), mean full thickness burn 18.28% (The t-value is -7.44188.

The p-value is < .00001. The result is significant at  $p < .05$ ), and mean serum creatinine 3.14 (The t-value is 9.61437. The p-value is < .00001. The result is significant at  $p < .05$ .) Among the survived subjects.

**Table 13:**

| Parameters          | Survived | Expired | Significance   |
|---------------------|----------|---------|--|
| Mean TBSA           | 34.58    | 61.42   | The t-value is 6.98036. The p-value is < .00001. The result is significant at $p < .05$ .  |
| Full thickness burn | 8.34     | 18.28   | The t-value is -7.44188. The p-value is < .00001. The result is significant at $p < .05$ . |
| Serum creatinine    | 1.49     | 3.14    | The t-value is 9.61437. The p-value is < .00001. The result is significant at $p < .05$ .  |



**Figure 9:**

**Baux score:** In the present study we assessed the Baux score among the study subjects. We observed that among survived subjects, all had score less than 140 (100%), while among expired subjects, 85.71% had less than 140, and 14.28% had score more than 140.

**Table 14:**

| Baux score    | Survived           |            | Mortality          |             |
|---------------|--------------------|------------|--------------------|-------------|
|               | Number of subjects | Percentage | Number of subjects | Percentage  |
| Less than 140 | 43                 | 100        | 6                  | 85.71428571 |
| More than 140 | 0                  | 0          | 1                  | 14.28571429 |
| Total         | 43                 | 100        | 7                  | 100         |

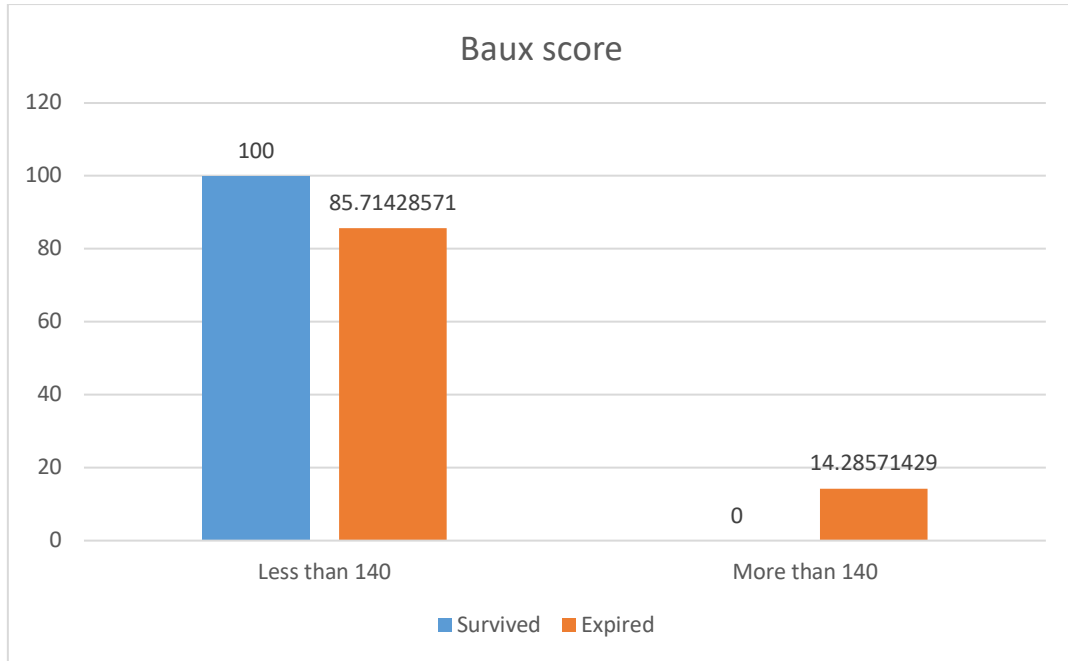


Figure 10: Baux score

**Modified Baux score:** In the present study we assessed the modified Baux score among the study subjects. We observed that among survived subjects, all had score less than 140 (100%), while among expired subjects, 57.14% had less than 140, and 42.85% had score more than 140.

Table 15:

| Modified Baux score | Survived           |            | Mortality          |            |
|---------------------|--------------------|------------|--------------------|------------|
|                     | Number of subjects | Percentage | Number of subjects | Percentage |
| Less than 140       | 43                 | 100        | 4                  | 57.14      |
| More than 140       | 0                  | 0          | 3                  | 42.85      |
| Total               | 43                 | 100        | 7                  | 100        |

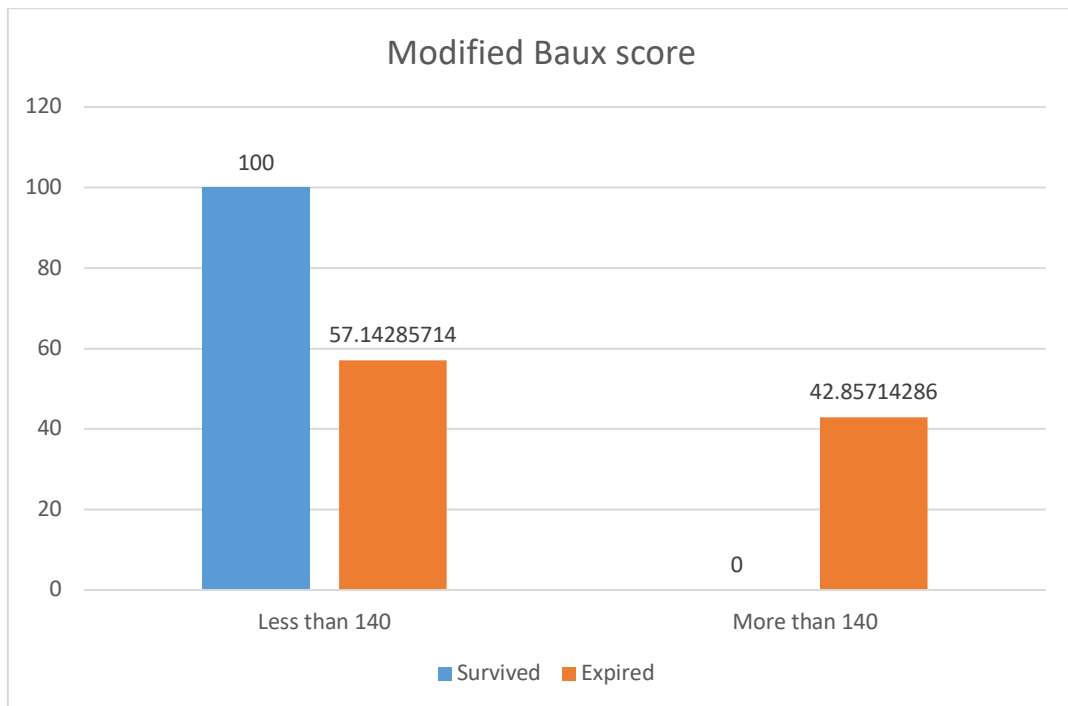


Figure 11: Modified Baux score

**Correlation Between Jabalpur SCORE And Modified Baux Score:** In the present study we studied the correlation between Modified Baux score and Jabalpur score. We observed significant positive correlation between two parameters. (The value of R is: 0.7328, The P-Value is < .00001. The result is significant at  $p < 0.05$ .)

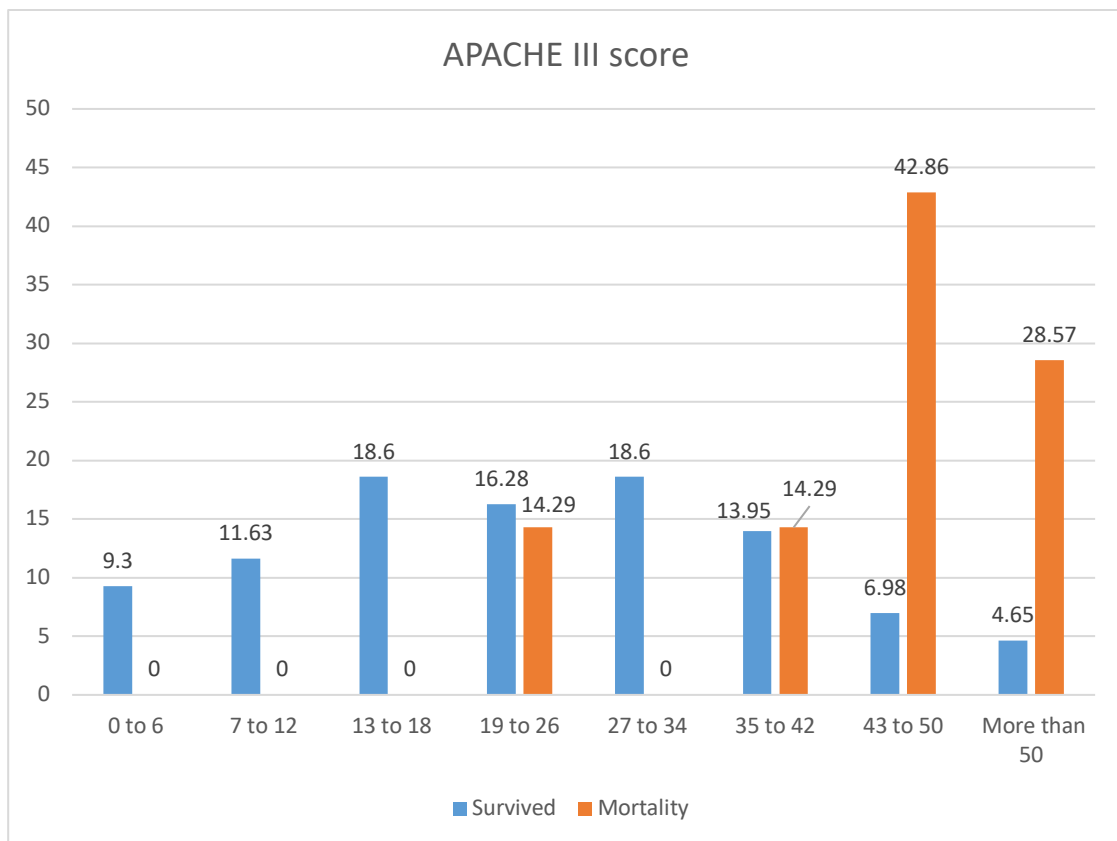
**Table 16:**

|                            |  |
|----------------------------|--|
| <b>Modified Baux score</b> | <b>Correlation with Jabalpur score</b>   |
|                            | The value of R is: 0.7328, The P-Value is < .00001. The result is significant at $p < .05$ . |

**Comparison of Apache III Score with Outcome:** In the present study we assessed the APACHE III score among study subjects and compared it with outcomes. We observed that mortality was greater among the subjects with comparatively higher APACHE III score.

**Table 17:**

| APACHE III score | Survived           |            | Mortality          |            |
|------------------|--------------------|------------|--------------------|------------|
|                  | Number of subjects | Percentage | Number of subjects | Percentage |
| 0 to 6           | 4.00               | 9.30       | 0.00               | 0.00       |
| 7 to 12          | 5.00               | 11.63      | 0.00               | 0.00       |
| 13 to 18         | 8.00               | 18.60      | 0.00               | 0.00       |
| 19 to 26         | 7.00               | 16.28      | 1.00               | 14.29      |
| 27 to 34         | 8.00               | 18.60      | 0.00               | 0.00       |
| 35 to 42         | 6.00               | 13.95      | 1.00               | 14.29      |
| 43 to 50         | 3.00               | 6.98       | 3.00               | 42.86      |
| More than 50     | 2.00               | 4.65       | 2.00               | 28.57      |
| Total            | 43.00              | 100.00     | 1.00               | 100.00     |

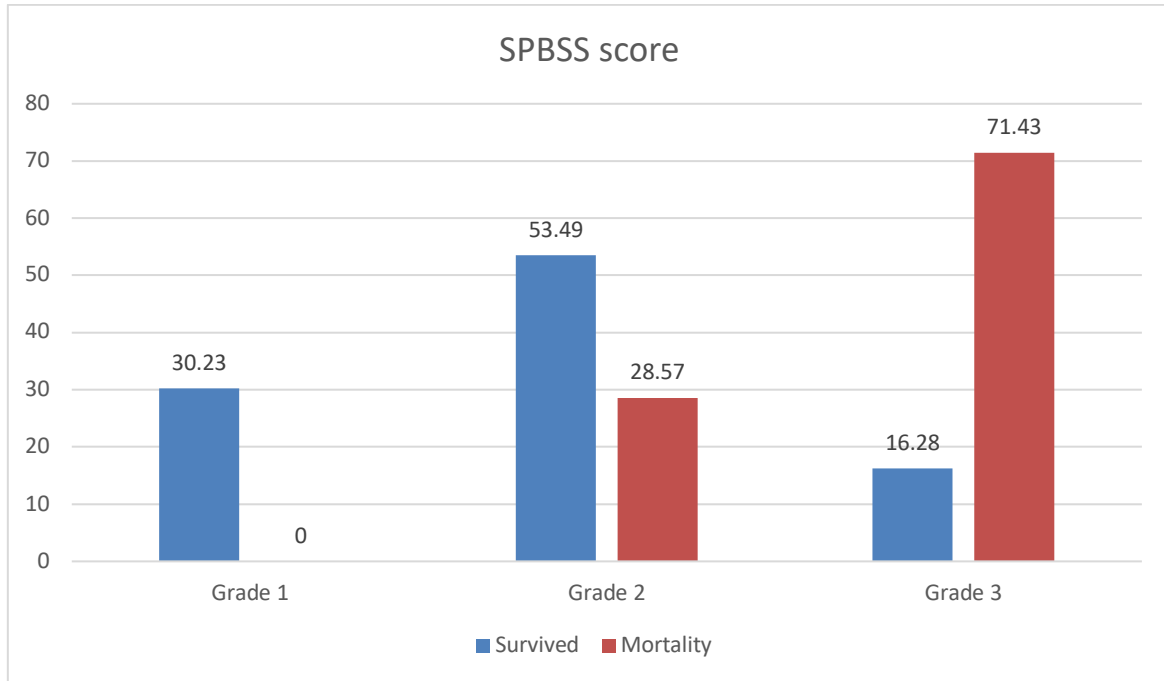


**Figure 12: APACHE III Score**

**Comparison of SPBSS Score with Outcome:** In the present study we assessed the SPBSS score among study subjects and compared it with outcomes. We observed that mortality was greater among the subjects with comparatively higher SPBSS score. Out of all survived 16.28% had grade 3 scores, and 71.43% subjects of all expired patients had grade 3 SPBSS score.

**Table 18:**

| Grading | Score    | Survived           |            | Mortality          |            |
|---------|----------|--------------------|------------|--------------------|------------|
|         |          | Number of subjects | Percentage | Number of subjects | Percentage |
| Grade 1 | -2 to 8  | 12                 | 27.91      | 0                  | 0.00       |
| Grade 2 | 9 to 16  | 24                 | 55.81      | 2                  | 28.57      |
| Grade 3 | 17 to 25 | 7                  | 16.28      | 5                  | 71.43      |
| Total   |          | 43                 | 100        | 7                  | 100        |

**Figure 13: SPBSS Score**

**Comparison between Jabalpur Score and SPBSS Score:** In the present study we assessed the Jabalpur score and SPBSS score. We evaluated the % mortality among the subjects which showed higher grading in both scores. We observed that 60% subjects with Jabalpur score more than 12 were expired, while 41.66% of subjects with grade 3 scores expired.

**Table 19:**

| Scores         | Number of subjects with High grade score | Mortality in the group | % mortality in the subjects with higher grade score |
|----------------|--|------------------------|---|
| Jabalpur score | 10                                       | 6                      | 60  |
| SPBSS score    | 12                                       | 5                      | 41.66   |

### Discussion

Differences in patient sub-sets and standards of burn care in various places demand that any prognostic model is first validated before their application in a new population. And this is the reason why independent/ different scoring systems – delivering good prognostication, discrimination and calibration are needed for independent population and data sets to identify the ones best suited. Hence the present study was conducted to compare above various scores with our own score and to evaluate best score/criteria to access prognosis in burns patients at the tertiary healthcare center in Maharashtra.

**Demographic distribution:** In the present study we assessed the gender wise distribution among the

study subjects. We observed that majority were males (82.19%), and 17.81% were female subjects. The male: female ratio in the present study was 4.61:1.

In the present study we assessed the age distribution among the study subjects. We observed that majority of the subjects belonged to 36 to 45 years (36%), followed by 46 to 55 years (36%), 36 to 45 years (36%), less than 35 years among 18% study subjects. The mean age of the study subjects was  $44.92 \pm 12.13$  years (median age 43.5 years).

**Total Body Surface Area:** In the present study we assessed the TSBA affected among the study subjects. We observed that among majority of the subjects 26 to 40% TSBA was affected (44%), followed by 41 to 45% TSBA (28% subjects), and

1% subjects had TSBA affected 1 to 25% and 45 to 55% each.

**Full body burn:** In the present study we assessed the full body burn area affected among the study subjects. We observed that among majority of the subjects 6 to 9% full body burn area was affected (44%), followed by 10 to 12% full body burn area among 28% subjects, and 10% subjects had full body burn area affected 0 to 5% and 13 to 18% each.

**Inhalational injury:** In the present study we assessed the presence of Inhalational injury among the study subjects. We observed that Inhalational injury was observed among 8% of the subjects while it was absent among 92% subjects.

**Jabalpur score:** In the present study we assessed the Jabalpur score among the study subjects. We observed that majority of the subjects had score less than 12 (80), While 20% subjects had score more than 12. In the present study we assessed the Jabalpur score among the study subjects. We observed that among survived subjects, all had score less than 12 (90.7%), while among expired subjects, 85.71% had less than 12.

**Outcome:** In the present study we assessed the outcomes among the study subjects. We observed that 86% subjects were survived, cured and discharged, while mortality was observed among 14% study subjects.

**Comparison of Extent of Burns With Outcomes:** In the present study we assessed the mean TSBA, mean full thickness burn and serum creatinine levels among survived and expired subjects. We observed mean TSBA of 34.42%, mean full thickness burn 8.34%, and mean serum creatinine 1.49 among the survived subjects, while mean TSBA of 61.42% (The t-value is 6.98036. The p-value is < .00001.

The result is significant at  $p < .05$ ), mean full thickness burn 18.28% (The t-value is -7.44188. The p-value is < .00001. The result is significant at  $p < .05$ ), and mean serum creatinine 3.14 (The t-value is 9.61437. The p-value is < .00001. The result is significant at  $p < .05$ .) Among the survived subjects.

**Baux score:** In the present study we assessed the Baux score among the study subjects. We observed that among survived subjects, all had score less than 140 (100%), while among expired subjects, 85.71% had less than 140, and 14.28% had score more than 140.

**Modified Baux score:** In the present study we assessed the modified Baux score among the study subjects. We observed that among survived subjects, all had score less than 140 (100%), while

among expired subjects, 57.14% had less than 140, and 42.85% had score more than 140.

**Correlation between Jabalpur SCORE and Modified Baux Score:** In the present study we studied the correlation between Modified Baux score and Jabalpur score. We observed significant positive correlation between two parameters. (The value of R is: 0.7328, The P-Value is < .00001. The result is significant at  $p < .05$ ).

Halgas et al in study in their comparison of injury scoring systems in predicting burn mortality The study compared the accuracy of seven previously validated burn-specific models and one new model derived for our cohort. Data were collected on age, ethnicity, gender, total body surface area burned (TBSA), inhalational injury, associated trauma, and injury severity (ISS, APACHE II). The accuracy of each model was tested using logistic regression, preserving the published regression coefficients. The revised Baux score was both accurate and easy to calculate, making it clinically useful. The older models demonstrated adequate predictive performance compared with the newer models. Even without key burn parameters, the APACHE II score performed well in critically ill patients with moderate to severe burn injuries.

**Comparison Of Apache III Score & With Outcome:** We observed that mortality was greater among the subjects with comparatively higher APACHE III score.

**Sion Prognostic Burns Scoring System and Its Comparison with Outcome:** In the present study we assessed the SPBSS score among study subjects and compared it with outcomes. We observed that mortality was greater among the subjects with comparatively higher SPBSS score. Out of all survived 16.28% had grade 3 scores and 71.43% subjects of all expired patients had grade 3 SPBSS score.

In the present study we assessed the Jabalpur score and SPBSS score. We evaluated the % mortality among the subjects which showed higher grading in both scores. We observed that 60% subjects with Jabalpur score more than 12 were expired, while 41.66% of subjects with grade 3 scores expired.

### Conclusion

The male: female ratio in the present study was 4.61:1. The mean age of the study subjects was  $44.92 \pm 12.13$  years (median age 43.5 years). We observed that 86% subjects were survived, cured and discharged, while mortality was observed among 14% study subjects. In the present study we assessed the Jabalpur score among the study subjects. We observed that among survived subjects, all had score less than 12 (90.7%), while among expired subjects, 85.71% had less than 12.

In the present study we assessed the mean TSBA, mean full thickness burn and serum creatinine levels among survived and expired subjects. We observed mean TSBA of 34.42%, mean full thickness burn 8.34%, and mean serum creatinine 1.49 among the survived subjects, while mean TSBA of 61.42% (The t-value is 6.98036. The p-value is < .00001.

The result is significant at  $p < .05$ ), mean full thickness burn 18.28% (The t-value is -7.44188. The p-value is < .00001. The result is significant at  $p < .05$ ), and mean serum creatinine 3.14 (The t-value is 9.61437. The p-value is < .00001. The result is significant at  $p < .05$ .) Among the survived subjects. In the present study we assessed the Baux score among the study subjects. We observed that among survived subjects, all had score less than 140 (100%), while among expired subjects, 85.71% had less than 140, and 14.28% had score more than 140. In the present study we assessed the modified Baux score among the study subjects.

We observed that among survived subjects, all had score less than 140 (100%), while among expired subjects, 57.14% had less than 140, and 42.85% had score more than 140. In the present study we studied the correlation between Modified Baux score and Jabalpur score.

We observed significant positive correlation between two parameters. (The value of R is: 0.7328, The P-Value is < .00001. The result is significant at  $p < .05$ .) In the present study we assessed the APACHE III score among study subjects and compared it with outcomes. We observed that mortality was greater among the subjects with comparatively higher APACHE III score.

We observed that mortality was greater among the subjects with comparatively higher SPBSS score. Out of all survived, 16.28% had grade 3 scores, and 71.43% subjects of all expired patients had grade 3 SPBSS score. In the present study we observed that 60% subjects with Jabalpur score more than 12 were expired, while 41.66% of subjects with grade 3 scores expired.

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