



MATERNAL AND FETAL OUTCOME OF BURNS DURING PREGNANCY IN A RURAL TEACHING HOSPITAL IN EASTERN PART OF INDIA

Obstetrics & Gynaecology

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ABSTRACT

Burns during pregnancy influence maternal as well as fetal outcome. Keeping this in view this study was undertaken to evaluate the maternal and fetal outcome in relation to burn extent, gestational age and etiology of burns.

This descriptive observational study was performed over three years period. A total of 16 cases of burn females with pregnancy were analyzed. There were 6 (37.5%) maternal death and 9 (56.25%) fetal deaths in our study. The mean percentage of total burn surface area (TBSA) was significantly higher in cases of maternal or fetal death ($p \leq 0.0001$ and 0.0001 respectively). The maternal and fetal mortality rates were also significantly higher when the burn was suicidal ($p \leq 0.001$ and $p = 0.001$, respectively).

Gestational age appeared unrelated to maternal mortality and the rate of fetal mortality decreased with increasing gestational age. Percentage of TBSA burn, suicidal burn injury was correlated with a higher maternal and fetal mortality.

KEYWORDS

Burn injury Pregnancy TBSA Mortality Gestational age

INTRODUCTION

Burn injury during pregnancy is not uncommon, but however, it has few published literatures on it. As per WHO injury report, females of South-East Asian Region have the highest fire related mortality rates [1]. The incidence of female burn patients of reproductive age group ranges from 0.6-15%, highest being reported from India[2].

The consequences of burn injury apart from mortality are disability, economic burden, social and psychological complications [3]. Burn injury results due to open fire cooking, wearing loose fitted synthetic clothes, unsafe cooking stove, illiteracy and social ritual of dowry [4]. During pregnancy, burns place an additional stress to the existing hyperdynamic physiological state and maternal complications like septicaemia and sepsis are leading cause of death [5]. Fetal complications include fetal distress, preterm labour and intra uterine fetal death [6]. Therefore, there is increased maternal and foetal mortality resulting of burn injury during pregnancy. It is reported that the maternal and fetal mortality is directly proportional to extent of burn injury and when above 50%, the casualties are higher [7]. Such patients require management by surgical and obstetric team and each case requires individualised management [8]. The principle of management of a burned pregnant woman is similar to a non-pregnant burnt woman which includes haemodynamic stabilization, wound dressing, tetanus prophylaxis with addition of fetal status assessment. Fluid therapy should be given judiciously and teratogenic drugs should be avoided [9].

MATERIALS AND METHODS

This is a descriptive study carried for a period of three years from 1st August 2017 to 1st August 2020 in Midnapore Medical College & Hospital, Midnapore, West Bengal, India. A total of 16 burn patients with pregnancy were included in the study. The patients were treated by multi-disciplinary team consisting of surgical and medical team along with department of Obstetrics and Gynaecology.

All pregnant patients with burn injury were included in the study and no exclusion criteria was applied. The parameters studied were cause of burn injury, gestational age of the pregnancy, total burn surface area (TBSA), maternal and fetal outcomes. Total burn surface area (TBSA) was calculated using Rule of nine. Statistical analysis was done using SPSS software. Statistical analyses of data of two groups were accomplished by the use of Fisher's exact test for discrete data and t-test for continuous data. Value of $p < 0.05$ is considered significant.

RESULTS

The results demonstrated that 16 cases of burns during pregnancy were

admitted during these 3 years study period (August 2017 to August 2020). On admission, the patients' age ranged from 16 to 36 years, with a mean age of 23.88 ± 5.48 years. Gestational age at the time of injury varied from 10 weeks to 38 weeks with 3 (18.75%) cases in first trimester, 7 (43.75%) in second trimester and 6 (37.5%) patients in third trimester. The percentage of TBSA varied from 8% to 90% with a mean of $40.44 \pm 26.92\%$. The etiology of injury was accidental in 12 (75%) and suicidal in 4 (25%) cases (Table-1). Distribution of burn extent in different trimester was shown in Table-2.

Age (years, mean)	23.88 ± 5.48
Gestational age	First trimester – 3 (18.75%) Second trimester- 7 (43.75%) Third trimester- 6 (37.5%)
Total burn surface area (TBSA)	$\leq 30\% = 8$ (50%) 31-50% = 2 (12.5%) 51-70% = 3 (18.75%) >70-100% = 3 (18.75%)
Etiology	Accidental = 12 (75%) Suicidal = 4 (25%)

TBSA	First Trimester	Second trimester	Third Trimester
$\leq 30\%$	1 (12.5%)	4 (50%)	3 (37.5%)
31- 50%	0 (0%)	1 (50%)	1 (50%)
51- 70%	1 (33.33%)	1 (33.33%)	1 (33.33%)
>70 - 100%	1 (33.33%)	1 (33.33%)	1 (33.33%)

Maternal and fetal outcome with respect to percentage of burn injury –

In burns up to 30% TBSA no maternal death occurred, in 31-50% TBSA one maternal death, in 51-70% TBSA two maternal death and in >70-100% TBSA, three maternal death occurred. The burn surface area of the deceased pregnant females was significantly higher than the survived ones (68.5% Vs. 23.6%; $p < 0.0001$) (Table-3).

TBSA	Maternal mortality	Fetal Mortality (%) (abortion +intrauterine death)
$\leq 30\%$	0/8 (0%)	1+0=1 (12.5%)
31-50%	1/2 (50%)	1+1=2 (100%)
51-70%	2/3 (66.66%)	2+1=3 (100%)
>70-100%	3/3 (100%)	2+1=3 (100%)
p-value	<0.0001	0.0001

In this study we found that, burn up to 30% total body surface area (TBSA) did not produce any effect on pregnancy in first trimester. During second trimester, one of the four cases aborted. In cases with burn injury up to 30% during third trimester, one out of three cases went into preterm labor.

Burn of 31-50% TBSA led to abortion of one case in the second trimester. Burn injury in the range of 31-50% during third trimester, one case was recorded which went into preterm labor and the baby was still born.

Burn injury of 51-70% TBSA led to abortion of all cases in the first and second trimester whereas one case of third trimester went into premature labor and was still born.

Burn injury of >70-100% TBSA led to abortion of all cases in first and second trimester and in third trimester one case went into premature labor and was still born. Thus, it was noted that the burn surface area of the pregnant women who either had stillborn baby or abortion was significantly more than the women having live babies (59.11% Vs. 15.00%; $p=0.0001$; **Table 3**).

Maternal death occurred in 6 out of the 16 cases (37.5%) cases and fetal death in 9 (56.25%). All the deceased patients had more than 30% TBSA burns. Of the 8 patients with more than 30% TBSA burns, 6 died and only 2 survived. No pregnancy was viable in more than 30% TBSA. There was a significant relationship between TBSA and maternal and fetal outcome ($p \leq 0.0001$ and $p = 0.0001$, respectively).

Maternal and fetal outcome with respect to period of gestation during burn injury –

According to gestational trimester, 1 out of 3 (33.33%) maternal death in first trimester, 2 out of 7 (28.57%) maternal death in second trimester and 3 out of 6 (50%) maternal death occurred in third trimester (**Table-4**).

Gestational Trimesters	Maternal Mortality	Fetal Mortality
First Trimester	1/3 (33.33%)	2/3 (66.66%)
Second Trimester	2/7 (28.57%)	4/7 (57.14%)
Third Trimester	3/6 (50%)	3/6 (50%)

Regarding fetal mortality, 2 out of 3 (66.66%) in first trimester, 4 out of 7 (57.14%) in second trimester and 3 out of 6 (50%) fetal death occurred in third trimester (Table-4). No significant association was seen between maternal and fetal mortality with gestational age during burn injury.

Maternal and fetal outcome with respect to etiology of burn injury –

The etiology of burns in 75% and 25% of the pregnant patients was accidental and suicidal respectively. Among the 12 patients with accidental burn, 3 (25%) maternal deaths occurred. Among the 4 patients with self-inflicted burns, there were 3 (75%) deaths. Maternal mortality was significantly higher in suicidal group (75% Vs. 25% ; $p < 0.001$) (**Table-5**).

Etiology	Maternal Mortality	Fetal Mortality	Mean TBSA
Accidental	3/12 (25%)	5/12 (41.66%)	28%
Suicidal	3/4 (75%)	4/4 (100%)	75.25%
p- value	<0.001	0.001	<0.001

The rate of fetal mortality was also significantly higher in the suicidal group. The 4 out of 4 (100%) fetal death occurred in suicidal group and 5 out of 12 (41.66%) fetal death in accidental group (100% Vs. 41.66% ; $p=0.001$).

DISCUSSION

As per study done in Gujrat by Shah et al; thermal injury (88%) constitute the majority of burn injuries followed by chemical (7%) and electrical (5%) injuries [4]. Majority of the thermal burns are due to housefire, kerosene stoves and hot water spill [3]. In our study, we encountered only thermal injuries.

Pregnancy is a state of hyperdynamic circulation and burn injuries lead to increase in capillary permeability leading to third space loss which

further leads to systemic hypotension [10]. Placental insufficiency, fetal ischemia, hypoxia and fetal acidosis are the subsequent extension of systemic hypotension developed [11]. This leads to fetal distress and preterm labor [6]. Adequate fluid therapy should be given to correct hypotension and supplemental oxygen to correct fetal ischemia. Ventilation is to be given when suspected lung injury due to smoke inhalation [11]. Infection by microbes such as staphylococcus and pseudomonas species can lead to systemic inflammatory response syndrome and sepsis . There is a greater risk of nosocomial pneumonitis once intubated. Therefore, proper nursing care of wounds, early debridement, antibiotic coverage should be implemented to reduce the risk of infection.[12]

The maternal mortality rate in our study was 37.5% which is similar to maternal mortality rate reported by Ogbogu CJ et al., of 30 % [9]. This is similar to rate reported by Mehdizadeh et al., [13] and Karimi et al.,[14] but is less than studies from different countries [2,15,16,17].

In our study, maternal mortality had a significant relationship with Total Body Surface Area of burn injury ($p < 0.0001$). Maternal mortality increased with more than 30% burn injury and was maximum with more than 50% burn surface area. Study by Agrawal P [2] showed a linear co-relation between maternal mortality and maternal total surface area of burn. The fatality rate of women with more than 50% burn injury was 3.33 times more than the women with smaller percentage of burn injury. A similar higher percentage of maternal mortality was seen in more than 25 % TBSA burn in a study by Mabrouk et al., in Egypt [18]. In study by Rayburn W, et al; a positive relationship between percentage of burn injury in pregnant women and maternal and fetal mortality was seen [10]. Study by Karimi H, et al; showed that in case of maternal and foetal mortality , the mean percentage of total body surface area was significantly higher [14]. Subrahmanyam M, in his study conducted in Western India , reported increased maternal and fetal mortality with more than 30% TBSA [17].

There was 56.25% fetal mortality in our study, which as similar to Karimi et al.,[14] (56.6%) but higher than previous recorded studies [19,20,21]. In our study, the critical percentage of TBSA burned for increased fetal death rate was 30% which is almost similar to that reported by Maghsoudi et al. [15] (40%). It was seen that when the burn injury was less than 30% TBSA , only 1 out 8(12.5%) fetal death occurred, but when it was more than 30% TBSA , 100% fetal death occurred. Relationship between TBSA and fetal mortality was extremely significant ($p=0.0001$)

The maternal mortality varied trimester wise , it was 33.33% in first trimester, 28.57% in second trimester and 50% in third trimester. It was also noted that in six maternal deaths in our study, the burn injury was more than 50% TBSA . Therefore, it is directly related to the extent of burn injury and not with gestational age. This finding is corroborated by other studies, which revealed higher mortality rate with more than 50% TBSA burn injury [13,22,23].

Fetal mortality varied with gestational age of the pregnancy as follows, 66.66% in first trimester, 57.14% in second trimester and 50% in third trimester. It is seen that the fetal mortality rates decreased with increasing gestational age. This finding is agreement with study done by Rezaei et al. [22] . Possibility of caesarean section and vaginal delivery , in the third trimester, as the fetus is viable reduces the rate of fetal mortality . Thus, it is recommended that viable pregnancies should be terminated as soon as the mother is resuscitated following severe burn injury. However, in our study, there was no caesarean section done and all were delivered vaginally.

The rate of mortality significantly depends upon the etiology of burns [2]. In present study the mortality rates of pregnant women and their fetuses with intentional burn injuries were found significantly higher than the non-suicidal group (75% Vs 25%; $p \leq 0.001$ for mother and 100% Vs 41.66% for fetus). Previous studies also had similar findings [22, 24,25]. Zarghami et al. [24] also found a higher mortality rate in cases of suicidal than in accidental cases of burn injury. In the accidental and self-inflicted group, the mean TBSA was 28% and 75.25 % respectively, which were significantly different ($p < 0.001$). Study by Vaghardoost et al; showed that mean burn percentage of the patients who intended to commit suicide was higher than that of other patients [25]. Thus, our study shows that the percentage of TBSA is an important factor for predicting outcome for pregnant women and fetus

with intentional burn injury.

CONCLUSION

Burn is a rare cause of maternal and fetal morbidity and mortality. In our third world country like India, there are few research papers published on this topic. Particularly a burn unit must be available in every tertiary care set-up. This descriptive study focuses on the scarcity of burn patient care in a rural tertiary care hospital, which leads to more mortality and morbidity of mother and baby as seen in our study.

Mostly of the burn injuries are accidental in nature and therefore are preventable. It can be avoided by educating the women about safe cooking habits and first aid. Programs should be included during antenatal check-up for those women whom are at high risk for such injuries in order to prevent such accidents. Strict implementation of laws will help in abolishing the system of dowry and thus, decreasing the incidence of burn injuries. Domestic violence is another factor causing burn injury, strict punishment should be given to the culprits to stop the crime.

Provision of Burn Unit including ICU, HDU setup, Level III NICU facilities are required to improve maternal and fetal outcomes.

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