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## Adverse maternal and fetal outcomes following acute burns injury in pregnancy: Experience from a private burns facility in rivers state

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### Abstract

**Background:** Generally, burns injuries are quite traumatizing and pose immense challenge in terms of management, worse if in pregnancy. The incidence of burns in pregnancy is low. The total body surface area (TBSA) and gestational age at presentation are major prognostic factors in determining both maternal and fetal outcomes, respectively.

**Objectives:** To evaluate the effects of burn injury on pregnancy as well as highlighting challenges encountered during the management of these cases in our facility. We also intend to share our experiences garnered during the period in review and make plausible recommendations that will aid in preventing the challenges.

**Materials and Methods:** A retrospective descriptive cross-sectional study of all pregnant women with acute burns injury admitted in the burns unit of Generation Specialist Hospital, Port Harcourt in Rivers State between January 2015 and December 2021. Information was collected from the medical records of the patients using a structured proforma and analysed with SPSS version 25.0

**Results:** A total of 197 cases of burns injury were admitted and managed in the facility, out of which seventeen (17) were pregnant women, giving an incidence of 8.6%. The mean age of the patients was  $26 \pm 2.29$  years, ranging between 18-35 years. Majority of the patients (14; 82.4%) have had at least a term delivery in the past. Cooking gas explosion was responsible for the majority of the burns injury (52.9%), followed by kerosene (29.4%) and hot water splash (17.6%) from kettles and cooking pots. Out of the seventeen (17) patients, 10 patients had fetal demise with over 50% occurring within the first and second trimesters. Spontaneous miscarriage rate was 35.3%. The incidence of maternal death is comparatively low (23.5%). This rate is positively correlated with the percentage of TBSA of the body affected. All the patients with TBSA of  $\geq 50\%$  had maternal death, as well as the fetuses

**Conclusion:** The incidence of burns in pregnancy is low. Cooking gas explosion remains the major cause of burns in our setting. Early pregnancy loss is one of the complications. Maternal and fetal outcome was positively correlated with amount of TBSA affected. Early intervention and multidisciplinary approach is key to reduce adverse maternal and fetal morbidity and mortality.

**Keywords:** Burns in pregnancy, maternal death, fetal death, total body surface area (TBSA)

### Introduction

Reproductive health of women, especially in pregnancy, is one of the major concerns in every community. Burns injury in pregnancy can cause severe disability and, even mortality. It poses significant socio-economic concerns, especially in the family of those concerned.

Globally, there is a dearth in the literature concerning the incidence of acute burns in pregnancy. However, it is said to be higher in low-income countries where incidence of between 3% and 7% has been reported<sup>[1, 2]</sup>. More than 90% of life-threatening acute burn injuries occur in these regions<sup>[3, 4]</sup>. Most of the published data in developed countries, which are more of case reports, show reduced incidence when compared to low-income countries<sup>[5]</sup>. Burns injury during pregnancy is a clinical state that demands special management approach to the mother and her unborn child. This is because of the limitations posed by the cardio-respiratory physiologic changes in pregnancy. Hence, there is increased incidence of morbidity and mortality to both the mother and fetus<sup>[5]</sup>. These injuries often result from hot water (scald), hot solids (contact burns), or exposed flames (flame burns) which may cause superficial or deep skin damages<sup>[6]</sup>.

The factors contributing to morbidity/mortality include; hypovolaemia, inhalational injury, septicaemia, and catabolic state associated with the burns.

Some authors have identified that materno-fetal outcomes are related to the percentage of the area burned and that when the burned area exceeds 50%, fetal as well as maternal morbidity/mortality increases significantly [7]. The essential principles of care for burns injury in pregnant and non-pregnant women are similar, except for some considerations as regards the use of drugs that might be teratogenic to the fetus.

Management is multi-disciplinary; involving the surgical team, obstetricians, paediatricians and other relevant units providing supportive care is necessary to achieve a favourable outcome. Prophylactic antibiotics are given to prevent sepsis, tocolytics for premature contractions as well as fluid and electrolyte therapy while the patient is stabilized [8]. The timing and mode of delivery are mainly based on obstetric indications. In the absence of contraindications, vaginal delivery is usually the preferred choice of delivery [9].

In view of the severe feto-maternal complications and dearth of data, we conducted this study to highlight some of the aetiological factors, investigate maternal and fetal outcomes, enumerate some of the challenges of management and to share our experience in managing acute burns injury in pregnancy.

### Materials and Methods

This was a retrospective study and critical perusal of the medical records of seventeen (17) pregnant women with burns injury that presented and managed in our facility over a 6-year period. The facility boasts of a team comprising a consultant plastic surgeon, 2 obstetricians, 5 medical officers as well as trained staff nurses and midwives.

In all the patients, information regarding their socio-demographic profiles, extent and degree of burns as well as feto-maternal outcomes were collated. The extent of the burns injury was calculated by using the Wallace rule of 9's. When the total body surface area (TBSA) affected is less than 10%, it is described as a minor burn. A major burn was defined as a partial or full thickness burn affecting greater than 10%.

Moderately severe burns were defined as a TBSA between 10-19%, 20-50% as severe and greater than or equal to 50% as critical (8). All the patients received adequate care in terms of fluid resuscitation, prophylactic antibiotics, basic burn care as well as psychological support. Obstetric evaluation was carried out to confirm duration of their pregnancy and other necessary obstetric history. Data collated were analysed using SPSS statistics version-25. Statistical results obtained were recorded.

### Results

During the period under review, a total of 197 cases of burns injury were admitted and managed in the facility, out of which seventeen (17) were pregnant women, giving an incidence of 8.6%. The mean age of the patients was  $26 \pm 2.29$  years, ranging between 18-35 years (fig 1). Majority of the patients (14; 82.4%) have had at least a term delivery in the past, as shown in fig 2.

The injuries were predominantly domestic and accidental. None from road traffic accident. Cooking gas explosion was responsible for the majority of the burns injury (52.9%), followed by kerosene (29.4%) and hot water splash (17.6%) from kettles and cooking pots (Table 1). In respect to the total body surface area of burns injury suffered, 5(29.4%) had moderately severe burns, 3 (17.6%) had severe burns while 9(52.9%) had TBSA  $\geq 50\%$ , defined as critical (fig 3). Gestational age at presentation showed that 8 patients presented in the first trimester, 2 in the second trimester and 7 in the third trimester (fig 4)

Fetal demise occurred in 10(58.8%) cases; 4 of these were in the first trimester, 2 in the second trimester and 4 in the third trimester, giving a spontaneous miscarriage incidence of 35.3%. Maternal death occurred in 4 out of the 17 cases, giving an incidence of 23.5%; 3 of the diseased patients each had TBSA  $\geq 50\%$ . One of the diseased patient with TBSA  $< 50\%$  had septicaemia complicating the burns injury. Table 2 shows a distribution of the patients according to trimester at presentation, TBSA, maternal and fetal outcomes. Out of the remaining 13 patients, 5 patients had emergency caesarean sections for fetal heart irregularities while 2 had spontaneous vaginal deliveries, all with live babies, giving a take home baby rate of 41.2%. They were all seen and monitored closely during the puerperal period.

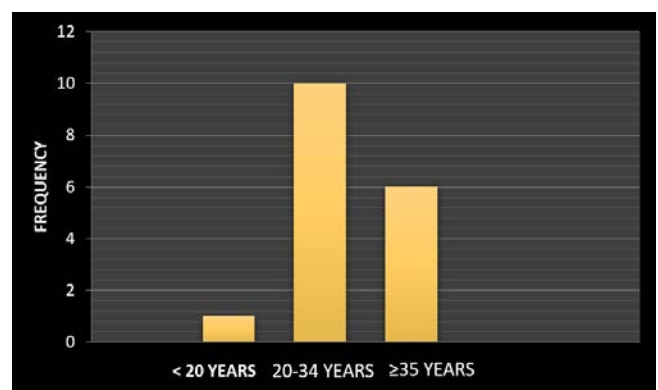


Fig 1: Maternal age range

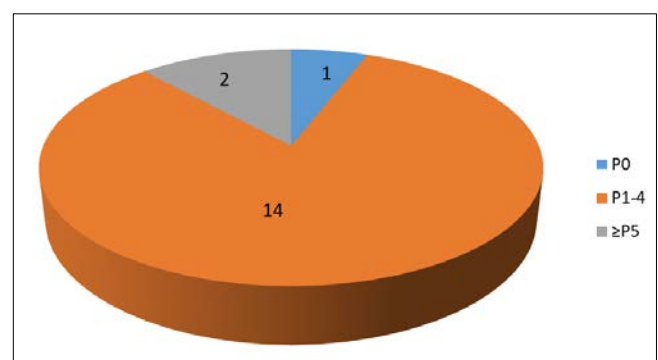


Fig 2: Parity of patients

Table 1: Aetiology of burns injury sustained by the patients

Aetiology of burn injury	Frequency (%)
Kerosene	5(29.4%)
Cooking gas explosion	9(52.9%)
Hot water burns	3(17.6%)

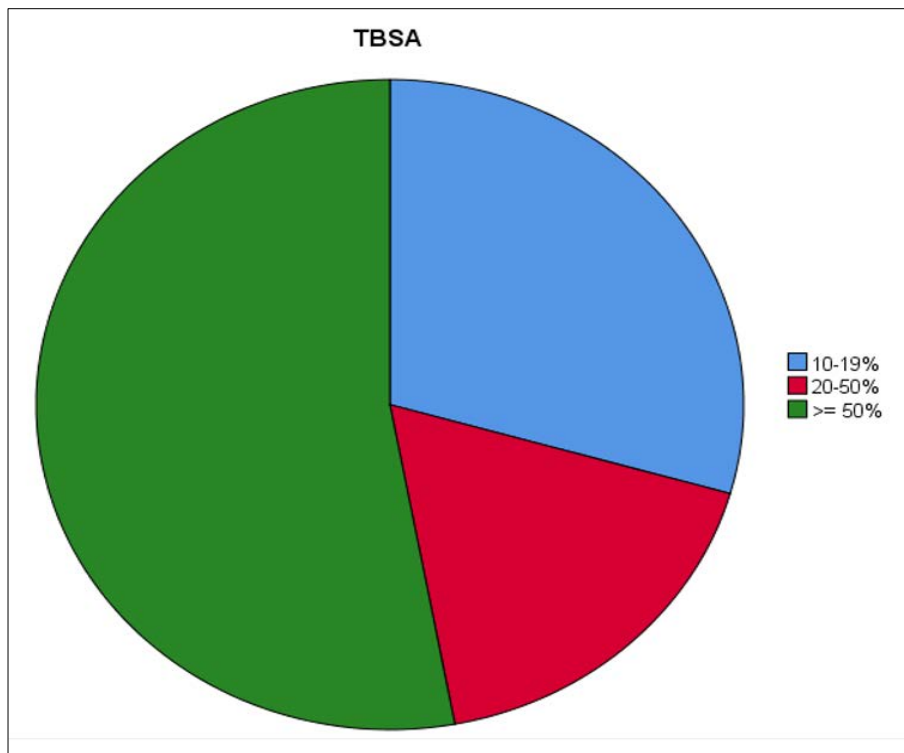


Fig 3: Patients distribution in relation to TBSA affected

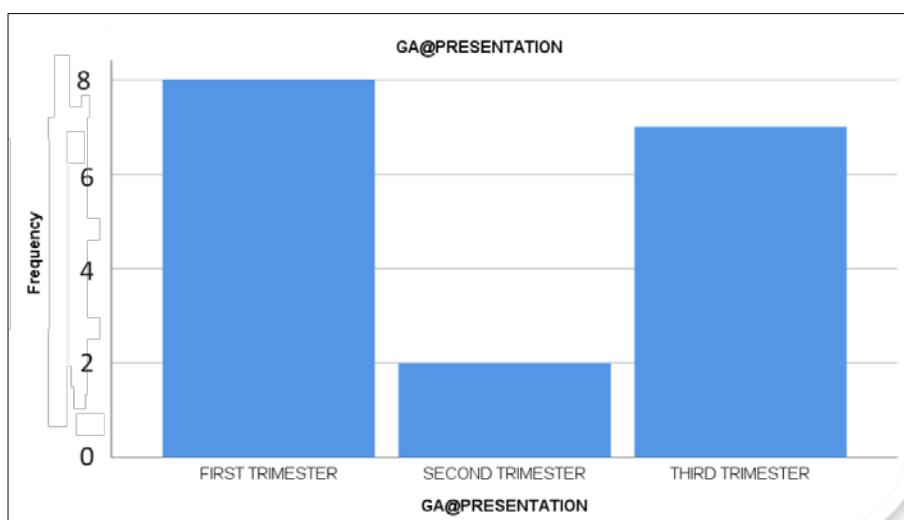


Fig 4: Patients gestational age at presentation

Table 2: Maternal and fetal outcome in relation to trimester at presentation and TBSA

S. No.	Pregnancy Trimester	TBSA (%)	Maternal Death	Fetal Death
1	2	70	√	√
2	1	35		√
3	3	12		
4	1	30		
5	3	18		
6	1	52	√	√
7	2	53		√
8	1	40	√	
9	1	50		
10	3	55	√	√
11	3	54		√
12	3	19		
13	1	62		√
14	1	16		
15	3	50		√
16	1	52		√
17	3	19		√

## Discussion

Burns injury during pregnancy occur more in developing countries than in developed countries [2]. The incidence of burns injury in pregnancy is 8.6% in this study. This is comparable to another study from Southeastern Nigeria [3]. Incidence of maternal and fetal morbidity and mortality is high, especially with the added physiological changes of pregnancy. Fetal survival is entirely dependent on maternal clinical outcome. Hence special care must be taken in the management of these patients.

Burns management in pregnancy is a multidisciplinary approach with the involvement of the obstetrician, the anesthetist, plastic surgeon, as well as the neonatologists. The presence of the fetus in-utero poses a constraint in using the common protocols for burns management generally. Hypo-perfusion of the fetoplacental unit is the main pathophysiological dynamics that occur during burns injury in pregnancy. Increased peripheral vascular dilatation following burns will lead to a reduction in blood supply to the fetoplacental unit, thus leading to progressive fetal morbidity which may culminate in fetal mortality.

Also, in the presence of pulmonary injury and sepsis, as recorded in one of our patients, there is additional maternal hypoxia as well as fetal hypoxemia. Thus any intervention to improve maternal blood volume, adequate oxygenation and prevention of sepsis will reduce the incidence of maternal as well as fetal deaths.

The total maternal mortality rate in our study was 23.5%, while other studies reported a maternal mortality rate between 28.3% and 63% [15-18]. This rate was positively correlated with the percentage of the total body surface area (TBSA) affected, as documented in other studies [4, 5]. Maternal death occurred in all the patients with a TBSA  $\geq$  50%. However, a maternal death occurred in one of the patients with TBSA of 40% following septicaemia. Hence, proper infection prevention should be top-notch so as to reduce maternal death from sepsis.

The incidence of fetal demise recorded in our study is high (58.8%). This is comparable to other studies [10-12]. Spontaneous miscarriage rate was 35.3% in this study. This was high when compared with another study [3]. The high spontaneous miscarriage rate in this study could be attributable to the fact that over 50% of our patients presented in the first and second trimesters of pregnancy. This further highlights the increased incidence of fetal demise with decreasing gestational age. 40% of fetal demise occurred in the first trimester which is in variance with and comparable to other studies; 25% [13] vs 72% [14].

Principles of management of a pregnant burns patient are not much different from non-pregnant burns patient [19]. It includes early and adequate resuscitation, combating sepsis with the use of antibiotics, fluid therapy, early surgical intervention and adequate nutrition. Within our resource limited facility, we were able to control for the above indices. Prohibitive cost of treatment materials posed some challenge in managing some of the patients who were indigent.

## Conflict of Interest

Not available

## Financial Support

Not available

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