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Maternal and Fetal Outcomes in Pregnant Women Presenting with Burn Injuries at PIMS Islamabad

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[1,2]Substantial contributions to the conception or design of the work; or the acquisition, [4,6]Active participation in active methodology, [2,3]analysis, or interpretation of data for the work, [5]Drafting the work or revising it critically for important intellectual content

Funding Source: None
Conflict of Interest: None

Received: Sept 2, 2025
Revised: Jan26, 2026
Accepted: Jan 30, 2026

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ABSTRACT

Objective: To evaluate the clinical characteristics, trimester-wise presentation, and fetomaternal outcomes of pregnant women presenting with burn injuries at Pakistan Institute of Medical Sciences (PIMS), Islamabad.

Methodology: This retrospective cohort study was conducted in collaboration between the Burn Center and Maternal and Child Health (MCH) Department at PIMS from May 2008 to October 2024. A total of 33 pregnant women with burn injuries were included after ethical approval and informed consent. Data regarding age, gestational age, total body surface area (TBSA), type and mode of burn, trimester-wise obstetrical management, and maternal and fetal outcomes were collected using a structured questionnaire. Burn severity was calculated using the Wallace Rule of Nines. Data were analyzed using SPSS version 25. Primary outcomes included maternal and fetal survival, while secondary outcomes assessed the impact of TBSA and management strategies on outcomes.

Results: The majority of patients were aged 21–30 years (63.6%). Distribution across trimesters was comparable. Flame burns were most common (75.8%), and 97% were accidental. Maternal survival was 39.4%, while fetal survival was 30.3%. Mortality strongly correlated with TBSA ($p < 0.001$), with 100% fetal mortality observed in burns exceeding 70% TBSA. Outcomes improved significantly over time ($p = 0.007$) with multidisciplinary care. Supportive therapy yielded better maternal survival in first and second trimesters, while delivery in the third trimester resulted in improved fetal survival. No-intervention management was associated with the poorest outcomes.

Conclusion: Burn severity is the strongest predictor of fetomaternal mortality. Early multidisciplinary management and trimester-specific obstetrical strategies significantly improve survival outcomes in pregnant burn patients.

Key Words Maternal mortality, TBSA, Fetus

Cite this article as: Maternal and Fetal Outcomes in Pregnant Women Presenting with Burn Injuries at PIMS Islamabad. Ann Pak Inst Med Sci. 2026; 22(1):58-63. doi. 10.48036/apims.v22i1.1634.

Introduction

The incidence of maternal and fetal morbidity and mortality in pregnant patients presenting with burns is very high. [1] The death toll icreases in burn patients reaching up to 100% with burn surface area of 70% and above.[2] There is paucity of research regarding obstetrical management of pregnant women having burn injuries.[3] The South Asian belt is majorly a combination of low resource countries were healthcare is expensive and out of reach for the common man. Our women and children are more likely to suffer from burn injuries and unable to get health services due to the social norms, be it antenatal care or burn care.[4,5] In Pakistan a study was conducted in our institute that also demonstrated that the leading cause of death was sepsis in such patients due to lack of awareness to receive care, delay in reaching hospital and then delay in receiving care.[6] Most of the cases referred to us were the ones that had survived multiple admissions and visited multiple hospitals and came to us as a last resort to their misery, exhausted and where family funding was already at the brink of extension with just hope.[7] To manage such patients and not mention their families is requires considerable physical and mental effort, from funding ,antenatal care, burn care ,pain relief, mental health demands ,nutrition neonatal care and rehabilitation

services .Yet we await the dawn of such care by conducting research as to how best can we approach such sensitive cases.[8]

There are no guidelines as how to manage such patients ,it just forms a small fraction of pregnancy and trauma.[2] Pregnancy itself is a physiologically compromising state and most of the mortalities in women occur secondary to it. Burns is a claim to fame of reconstructive surgery and patients having severe burns need ICU care and prolonged rehabilitation.[9] Obstetrics on the other hand is quick minute to minute changing surgical field far from prolong however each is special in its own way. The rehabilitation of such patients and their family goes hand in hand with there demands of completing their families.[10, 11] We have encountered many patients in our study whose last communication with us was would we survive unfortunately in a majority of cases we were not able to save the mother or her kid. Then we thought why not do a research so as to find out what would be a better care plan.

Different management plans such as progesterone support, vitamins, hormonal support and magnesium sulphate are recommended in various studies.[12]As Pakistan abortion law states that no pregnancy is to be terminated unless the mother is dying due to the pregnancy we need to be vigilant to monitor such cases that are presenting in countries like ourselves.[13, 14] New researches have contributed to various medications and their different routes that are easier to administer in ICU patients. [(15)] Due to the lack of cases the evidence is greatly lacking on the above mentioned topic however some researches indicate that termination of pregnancy is not in favour of patients rather a spontaneous termination by the mother's body is better and has higher survival rates.[16]

Women generally present with accidental burns secondary to flames, scalds and a few with chemical and electric burns.[17] The mortality in flame burns is less as compared to electric burns. A compromising status of mother leads to mostly fetal death. The fetuses not exposed directly to the burn surprisingly had a burnt dehydrated appearance.[18]

Multidisciplinary approach is necessary to provide better care in such patients. These cases are always should be discussed in a multidisciplinary committee.[19] The patient whether one in a million or billion need to be managed and given quality care. [20]

The purpose of this study was to determine the various trends of burn injuries in presenting in different trimesters of pregnant women and their respective fetomaternal outcomes. We also tried find out which obstetrical management would be best for baby and mother.

Methodology

This retrospective cohort study was conducted at Pakistan institute of medical sciences by the collaboration of Maternal and child healthcare care center and burn center. Ethical board approval was sort from the hospital committee. The patients were recruited from May 2008 to October 2024 that were under care of to MCH or Burn center fulfilling the inclusion criteria of the study. The inclusion criteria stated recruiting anonymously all the pregnant patients presenting with burn injuries giving consent. A total of 33 patients were included**.** A structured questionaries' was filled and the mother and babies followed. Patient control numbers, contacts, age and date of admission were recorded ensuring transparency of research article. The confidentiality of each patient was maintained

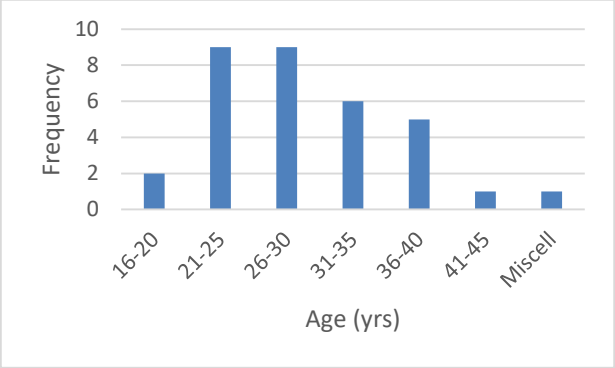
The data included the gestational age of patient, percentage of burn surface area that was calculated by Wallace rule of nine and history of the patient guided regarding type and mode of burn.[21]

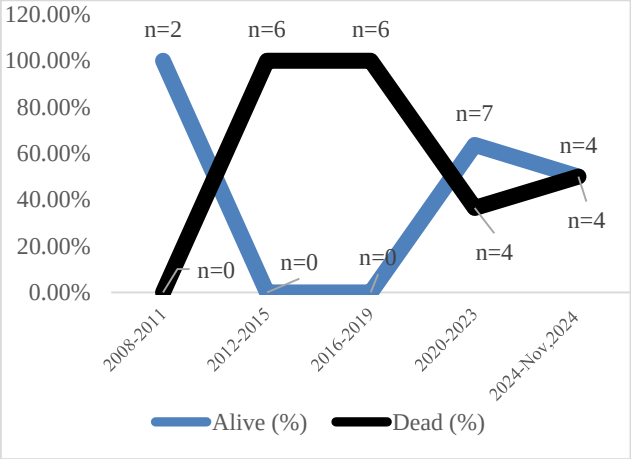
The mother and babies were followed up physically when the presented to us in the outpatient department. Those patients that had come from far flung areas were contacted on the telephone. Maternal outcomes that is whether the patient survived or not were recorded. Fetal outcomes and mode of delivery also documented. The management plan trimester wise was also noted. Data was analyzed by SPSS 25 both nominal and ordinal data reviewed and presented as table, graph and pie charts for interpretation. Simple principles of statistics applied for easier understanding.

Results

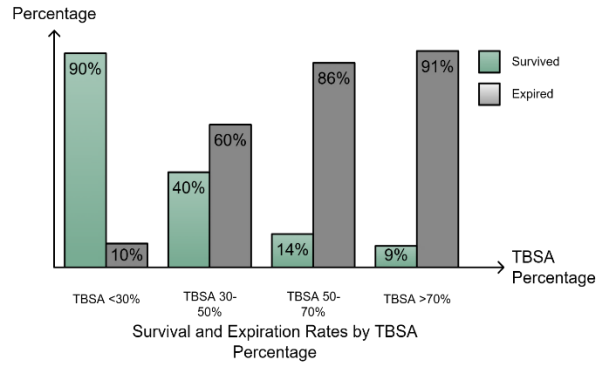
All patients presenting to Maternal and child health PIMS and those admitted in burn center for which obstetrical consultation was sort and were managed under multidisciplinary cases giving consent were recruited making a total of 33 patients. The age was from 20 to 45yrs (63.6%, n = 21, aged 21–30 years). (Figure 1) Patient admissions increased over time, peaking in 2020–2023 (n = 15) compared to 2008–2011 (n = 4), while maternal mortality decreased significantly (p = 0.007*) under multidisciplinary care (Figure 2)

doi. 10.48036/apims.v22i1.1634





Patients presented equally in all trimesters: first (n = 11), second (n = 10), and third (n = 12). Flame burns predominated (75.8%, n = 25), followed by electric (n = 4), scald (n = 3), and chemical burns (n = 1). Nearly all cases were accidental (97.0%, n = 32), with one suicidal instance (3.0%). Burn severity varied: <30% TBSA (n = 10), 30–50% (n = 5), 50–70% (n = 7), and >70% (n = 11). Maternal mortality correlated strongly with TBSA (p < 0.001*), declining from 90% survival at <30% TBSA (n = 9/10 alive) to 9.1% at >70% (n = 1/11 alive). Fetal mortality followed a similar pattern (p = 0.008*), with 100% demise at >70% TBSA (n = 6/6 expired).(Figure 3)



Active management strategies improved outcomes: maternal survival was highest with supportive therapy (55.6%, n = 5/9) and fetomaternal surveillance (57.1%, n = 4/7), while fetal survival reached 100% with delivery (n = 5/5 alive). In contrast, no intervention led to 9.1% maternal survival (n = 1/11 alive) and universal fetal mortality (n = 0/9 alive), and termination of pregnancy resulted in 0% survival for both mother (n = 0/1*) and fetus (n = 0/1*; p < 0.001*). Younger maternal age showed a non-significant trend toward better fetal survival (p = 0.527*). Overall, 39.4% of mothers (n = 13) and 30.3% of fetuses (n = 10) survived, with improved outcomes observed in recent years.(Table 1).

Discussion

We are living in Pakistan a developing country with a population of over 230 million. The rapidly growing population has led to strained healthcare infrastructure and a shortage of trained medical professionals. To make the matters even worse, cultural and societal barriers prevent many women from seeking antenatal care during pregnancy. Pregnant women are prone to many complications. The younger and less educated at a greater risk of complications associated with pregnancy.[22, 23] Most of such complications are preventable as the nature determined in our study was mostly accidental.Trauma in pregnancy makes a tiny portion of these complications and are generally referred to tertiary care hospitals for management. One of these conditions are burn injuries. They can have severe consequences for both the mother and her unborn child if not properly managed. Studies suggest that burn injuries in pregnant patients are relatively common in Pakistan, often associated with domestic accidents and poor safety awareness.The most common cause of such injuries in Pakistan was due to gas leakage and cylinder blasts.[24]

The major chunk out of which were women and children however, there is no specific data on the exact percentage of burn injuries in pregnant patients, underlining the need for targeted research and improved healthcare resources to address this significant issue.[25] We found in our research project that pregnant women with more extensive burn injuries were referred to us for better care. As the passing years the maternal and fetal mortality in pregnant patients have declined due to better multidisciplinary care. The awareness for burn patients to seek early care if presenting for antenatal care and to be identified whether they are pregnant or not if they present to burn center has increased significantly. This has greatly improved outcomes.

Compared to the rest of the studies we had an increased survival rate of pregnant patients with burn injuries, some

Table I: Trimester-wise Distribution of Burn Severity, Obstetrical Management Strategies, and Corresponding Maternal and Fetal Outcomes Among Pregnant Burn Patients (n = 33)

Trimester	Percentage of burn to mother	Management	Maternal outcome		Fetal outcome		
			Alive	Expired	Alive	Expired	Continued
1st	Less than 30%	No intervention	1				1
		Supportive therapy	2		1		1
		Termination of pregnancy					
	30 – 50%	No intervention					
		Supportive therapy	1		1		
		Termination of pregnancy					
	50 – 70%	No intervention		1		1	
		Supportive therapy	1	1		2	
		Termination of pregnancy					
	Greater than 70%	No intervention		1		1	
		Supportive therapy	1	2		2	1
		Termination of pregnancy					
2nd	Less than 30%	No intervention					
		Fetomaternal surveillance	2		2		
		Termination of pregnancy					
	30 – 50%	No intervention		1		1	
		Fetomaternal surveillance					
		Termination of pregnancy					
	50 – 70%	No intervention		1		1	
		Fetomaternal surveillance		1		1	
		Termination of pregnancy					
	Greater than 70%	No intervention		3		3	
		Fetomaternal surveillance		1		1	
		Termination of pregnancy		1		1	
3rd	Less than 30%	No intervention					
		Fetomaternal surveillance	1	1		1	1
		Delivery of fetus		4	2		2
	30 – 50%	No intervention		1		1	
		Fetomaternal surveillance	1		1		
		Delivery of fetus					
	50 – 70%	No intervention		2		2	
		Fetomaternal surveillance		1		1	
		Delivery of fetus		1	1		
	Greater than 70%	No intervention					
		Fetomaternal surveillance					
		Delivery of fetus					

studies suggested 100% mortality in patients having TBSA more than 40% although in our case it was only true for burn injuries of more than 70%. Like the rest of the studies, it was observed that the higher the TBSA, the higher the mortality rate.[26] The maternal stability even with more burn surface area is likely to decrease the fetal and maternal mortality.[27] The overall amount of patients with extensive burn injuries in pregnancy was fortunately very small.[28]

Maternal stability is necessary to achieve, we found out that the termination of pregnancy is better for the fetus but not for mother because it renders the mother hemodynamically unstable, until and unless she is in her third trimester where it helps in her recovery. Our study also suggested that continuing the pregnancy is better for the mother unless the baby expires in the second and third trimesters.

Pregnancy is a challenging journey for the family and when added up with trauma becomes even more difficult. To carry a foreign object that's part you and part someone else, the body definitely has to mold itself to adapt to the requirements of this foreign object for which a woman is called a mother. Its physiological stress.

To give antenatal care to pregnant patients with burn injuries different strategies have been determined but due

to the scarcity of data it is difficult to judge what could be better. Studies conducted internationally documented the need of more research in the field.[29]

We found in our study that like the rest of the studies supportive therapy is beneficial for both mother and baby. Folic acid supplementation and progesterone 400 microgram for support of pregnancy. A with good liaise on with the burn care team for adequate fluid management and prevention of sepsis had better maternal and fetal outcomes. In the second trimester hematinic, progesterone support and dexamethasone cover were the best management options. In most cases Magnesium sulfate for neuroprotection and tocolysis could not be offered as the kidneys are already compromised and magnesium sulphate would be detrimental to them and the health of the mother always comes before fetus. Similarly Ventolin or terbutaline are also usually contraindicated due to maternal concerns.[27] In the third trimester a cesarean section was better to be performed as it helps resuscitate the mother greatly and the baby has increasing rates of survival as compared to the rest of the trimesters. Generally burn patients in our country usually succumb to sepsis and multiorgan failure yet there are rays of hope.[30]

We were lucky in one such cases that one of our burn survival patients having 60% TBSA mostly abdomen and thighs came back for her next cesarean section to us. She had extensive keloid formation and contractures but went home with her both her babies just fine. There were also concerns that surviving kids might develop cerebral palsy however our patients babies did not develop any kind of mental issues up to now this is, however an uncharted sea.[3]

Limitation: This study was carried out retrospective due to scarcity of data. A larger sample size is needed to exactly determine the best management but at least this study can give us glimpse of what we need to plan for better mother and baby outcomes in burn inflicted pregnant women.

Conclusion

For pregnant patients presenting with burns in first and second trimester supportive therapy is beneficial including folic acid, calcium, iron, progesterone support and in viable pregnancies dexamethasone cover. In the third trimester we have to deliver the baby as soon as reasonably possible.

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