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Frequency of Obstetrical Admissions in Intensive Care Unit

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ABSTRACT

Background: Obstetrical admission to intensive care unit is an important indicator of severe maternal morbidity and poor pregnancy outcome. Pregnant women may rapidly develop life threatening complications during pregnancy, delivery or postpartum period which require intensive monitoring and management. **Objective:** To determine the frequency of obstetrical admissions in intensive care unit. **Study Design:** Cross sectional study. **Duration and Place of Study:** This study was conducted from 11th January 2025 to 11th May 2025 at the Department of Obstetrics and Gynaecology, Ayub Teaching Hospital Abbottabad. **Methodology:** A total of 271 obstetrical patients aged 18–40 years with singleton pregnancy and gestational age more than 20 weeks were included in the study. Demographic details, clinical findings and reasons for intensive care unit admission were recorded on preformed proforma. Data were analysed by using IBM Statistical Package for Social Sciences version 26. **Results:** The mean age of patients was 28.41 ± 6.12 years and mean gestational age was 35.88 ± 2.83 weeks. Out of 271 patients, 27 (10.0%) required intensive care unit admission. The most common causes of admission were preeclampsia/eclampsia 8 (29.6%) and postpartum haemorrhage 8 (29.6%). Intensive care unit admission showed significant association with age >30 years (p=0.005), parity >2 (p<0.001), body mass index >25 kg/m^2 (p<0.001) and education level (p=0.008). **Conclusion:** Obstetrical intensive care unit admission were not uncommon and hypertensive disorders along with postpartum haemorrhage remained the major causes of critical maternal illness

INTRODUCTION

Peripartum ICU admissions are an issue of high importance in maternal healthcare as pregnant and postpartum women can quickly suffer from serious adverse outcomes that require intensive surveillance and appropriate management.[1] ICU admissions associated with the peripartum period usually take place because of potentially lethal diseases developing during pregnancy, birth, or shortly after delivery.[2] ICU patients commonly need hemodynamic monitoring, oxygen therapy, blood transfusions, and sometimes even mechanical ventilation due to the possibility of fast changes in their condition.[3] Some of the main causes of ICU admissions among pregnant and postpartum women are postpartum hemorrhage, hypertensive conditions, including eclampsia and preeclampsia, infections leading to sepsis, thromboembolism, and heart problems.[4]

Obstetrical patients admitted in intensive care unit differ from other ICU patients because physiological changes of pregnancy can complicate diagnosis and treatment.[5] During pregnancy there is increase in cardiac output, blood volume and oxygen consumption, therefore critically ill pregnant women may deteriorate rapidly if not managed properly.[6] The most common indication for ICU admission in obstetrics is severe haemorrhage especially postpartum haemorrhage which can lead to hypovolaemic shock and disseminated intravascular coagulation.[7] Hypertensive disorders also contribute greatly because eclampsia and HELLP syndrome can cause seizures, renal failure, pulmonary oedema and cerebral complications.[8] Sepsis remain another important cause of ICU admission due to puerperal infection, urinary tract infection or septic abortion.[9]

Incidence rates of ICU admission during obstetric events differ from country to country, indicating the varying quality of care provided, social class, and healthcare facilities. In developed countries, there are relatively low levels of ICU admission attributed to proper antenatal screening and effective handling of any complication; however, in developing nations, high rates of ICU admission exist.[10] Most of the ICU admissions comprise women who are young and multiparous. Also, unbooked pregnancy and late arrival to the hospital are some of the common reasons for ICU admission of these women.[11] One thing that is usually common in the admission of these patients into the ICU is cesarean delivery because surgery is needed.

In fact, the cases that lead to intensive care unit (ICU) admissions for obstetric emergencies cause considerable morbidity and mortality rates both in the mother and her newborn. Such problems are often observed in underdeveloped countries owing to delayed ICU referral and inadequate antenatal care provision. Understanding the causes and risk factors leading to ICU admissions will help diagnose critically ill pregnant women earlier, thus providing appropriate treatment. Therefore, the purpose of this current study is to obtain local data about ICU admissions of obstetric patients. The objective of this study is to determine the frequency of obstetrical admissions in intensive care unit.

METHODOLOGY

This cross-sectional study was carried out at the Department of Obstetrics and Gynaecology, Ayub Teaching Hospital from 11th January 2025 to 11th May 2025. Approval for the study was taken from the hospital ethical committee before start of data collection and all procedures were performed according to institutional ethical principles. The sample size was 271 patients which was calculated by using WHO sample size calculator with 95% confidence interval, 2% margin of error and expected frequency of obstetrical admissions in intensive care unit as 2.9%.[12]

Inclusion Criteria

Women aged 18 to 40 years, having singleton pregnancy confirmed on ultrasound, gestational age more than 20 weeks according to last menstrual period, any parity and patients admitted in intensive care unit for more than 24 hours were included in the study.

Exclusion Criteria

Patients shifted to intensive care unit only because of unavailability of operation theatre or postoperative room without any critical medical or obstetrical illness were excluded from the study.

After taking permission from ethical committee, patients fulfilling the eligibility criteria were included in the study. Written informed consent was obtained from all patients after proper explanation regarding purpose, risks and benefits of the study. Demographic details including age, gestational age, parity, body mass index, education level, residential status, socioeconomic status were noted. History taking and clinical examinations were done to all participants in the study. Medical records and reports of the obstetric population were analyzed to identify reasons for admission into the ICU. Findings from all examinations and observations were entered in a predetermined data collection form. Obstetric ICU admissions were identified based on the following criteria: pregnancies with ICU admission time exceeding 24 hours due to conditions like preeclampsia, postpartum bleeding, sepsis, acute respiratory distress syndrome, and cardiac problems.

All collected data were entered and analysed by using IBM SPSS version 26. Quantitative variables including age, gestational age, body mass index and parity were presented as mean ± standard deviation. Categorical variables including education level, residential status, socioeconomic status and obstetrical admissions in intensive care unit were presented as frequencies and percentages. Stratification of obstetrical admissions in intensive care unit was done with respect to age, gestational age, parity, body mass index, education level, residential status, socioeconomic status. Post-stratification chi square test or Fisher's exact test was applied and p-value ≤0.05 was considered as statistically significant.

RESULTS

The study enrolled a total of 271 obstetrical patients. The mean age of the patients was 28.41 ± 6.12 years, with a mean gestational age of 35.88 ± 2.83 weeks. The mean parity was 2.49 ± 1.61 and the mean body mass index (BMI) was 26.96 ± 2.59 kg/m^2. Regarding residential status, majority of the patients were from rural areas 184 (67.9%), whilst 87 (32.1%) were from urban areas. In terms of educational level, 111 (41.0%) patients were uneducated, 78 (28.8%) had primary level education, 52 (19.2%) had secondary level education, and only 30 (11.1%) had higher education. With respect to socioeconomic status, more than half of the patients 160 (59.0%) belonged to low socioeconomic class, 94 (34.7%) were from middle class, and 17 (6.3%) were from high socioeconomic class (Table-I).

Table I

Patient Demographics

Demographics	Mean ± SD / n (%)
Age (years)	28.41 ± 6.12
Gestational Age (weeks)	35.88 ± 2.83
Parity	2.49 ± 1.61
BMI (Kg/m^2)	26.96 ± 2.59
Residential Status	
Rural n (%)	184 (67.9%)
Urban n (%)	87 (32.1%)
Education Level	
Uneducated n (%)	111 (41.0%)
Primary n (%)	78 (28.8%)
Secondary n (%)	52 (19.2%)
Higher n (%)	30 (11.1%)
Socioeconomic Status	
Low n (%)	160 (59.0%)
Middle n (%)	94 (34.7%)
High n (%)	17 (6.3%)

Out of total 271 patients, 27 (10.00%) required admission to the intensive care unit (ICU), whereas the remaining 244 (90.00%) patients did not required ICU admission during their obstetrical course (Table-II).

Table II

Frequency of Obstetrical Admissions in Intensive Care Unit

Obstetrical ICU Admission	Frequency	%age
Yes	27	10.00%
No	244	90.00%
Total	271	100%

Among the 27 patients who were admitted to the ICU, the most frequent reasons for admission were preeclampsia/eclampsia and postpartum haemorrhage, each accounting for 8 cases (29.60%). Sepsis was responsible for 3 admissions (11.10%), whilst acute respiratory distress syndrome, cardiac disease, and HELLP syndrome each contributed 2 cases (7.40%). Antepartum haemorrhage and severe anaemia/shock were the least frequent causes, with 1 case each (3.70%) (Table-III).

Table III

Reasons for Obstetrical ICU Admission (n=27)

Reason for Admission	Frequency	%age
Preeclampsia/Eclampsia	8	29.60%
Postpartum Haemorrhage	8	29.60%
Sepsis	3	11.10%
Acute Respiratory Distress Syndrome	2	7.40%
Cardiac Disease	2	7.40%
HELLP Syndrome	2	7.40%
Antepartum Haemorrhage	1	3.70%
Severe Anaemia/Shock	1	3.70%
Total	27	100%

The association of ICU admission with various demographic factors were also examined. With regards to age, ICU admission was significantly more frequent in patients aged more than 30 years 18 (16.1%) as compared to those aged 30 years or below 9 (5.7%), and this difference were found to be statistically significant (p=0.005). Concerning gestational age, 17 (11.3%) of patients with gestational age of 36 weeks or less required ICU admission in comparison to 10 (8.3%) of those with gestational age of more than 36 weeks, however this association did not reached statistical significance (p=0.425). With respect to parity, ICU admission were markedly higher among patients with parity more than 2, where 25 (21.2%) required ICU care, as compared to only 2 (1.3%) in those with parity of 2 or less, and this association were highly significant (p<0.001). Regarding BMI, none of the patients with BMI of 25 kg/m^2 or below 0 (0.0%) required ICU admission, whereas 27 (13.9%) of patients with BMI greater than 25 kg/m^2 were admitted to ICU, which were also highly significant statistically (p<0.001). In terms of residential status, ICU admission rate were nearly similar between rural 18 (9.8%) and urban patients 9 (10.3%), with no statistically significant difference observed (p=0.885). With respect to education level, highest rate of ICU admission were noted among patients with higher education 8 (26.7%), followed by primary level 8 (10.3%), uneducated patients 9 (8.1%), and secondary level 2 (3.8%), and this association were statistically significant (p=0.008). Finally, regarding socioeconomic status, ICU admission were recorded in 18 (11.3%) of low socioeconomic patients, 6 (6.4%) of middle class, and 3 (17.6%) of high class patients, however no statistically significant association were found between socioeconomic status and ICU admission (p=0.249) (Table-IV).

Table IV

Association of Obstetrical ICU Admission with Demographic Factors

Demographic Factors	Subgroup	ICU Admission Yes n(%)	ICU Admission No n(%)	Total n(%)	p-value
Age (years)	≤30	9 (5.7%)	150 (94.3%)	159 (100%)	0.005
	>30	18 (16.1%)	94 (83.9%)	112 (100%)	
Gestational Age (weeks)	≤36	17 (11.3%)	134 (88.7%)	151 (100%)	0.425
	>36	10 (8.3%)	110 (91.7%)	120 (100%)	
Parity	≤2	2 (1.3%)	151 (98.7%)	153 (100%)	<0.001
	>2	25 (21.2%)	93 (78.8%)	118 (100%)	
BMI (Kg/m^2)	≤25	0 (0.0%)	77 (100.0%)	77 (100%)	<0.001
	>25	27 (13.9%)	167 (86.1%)	194 (100%)	
Residential Status	Rural	18 (9.8%)	166 (90.2%)	184 (100%)	0.885
	Urban	9 (10.3%)	78 (89.7%)	87 (100%)	
Education Level	Uneducated	9 (8.1%)	102 (91.9%)	111 (100%)	0.008
	Primary	8 (10.3%)	70 (89.7%)	78 (100%)	
	Secondary	2 (3.8%)	50 (96.2%)	52 (100%)	
	Higher	8 (26.7%)	22 (73.3%)	30 (100%)	
Socioeconomic Status	Low	18 (11.3%)	142 (88.8%)	160 (100%)	0.249
	Middle	6 (6.4%)	88 (93.6%)	94 (100%)	
	High	3 (17.6%)	14 (82.4%)	17 (100%)	

DISCUSSION

In the current study, the total number of ICU admissions was found to be 27, which accounted for 10% of the total obstetric population. This demonstrates that a considerable portion of the obstetric population needs critical care during their stay in the hospital. This finding corresponds well with the results obtained in other studies done in developing nations, where there is poor prenatal care and a delay in hospital admission of mothers, leading to increased maternal morbidity. In the current study, the commonest reason for ICU admissions was preeclampsia/eclampsia and postpartum hemorrhage, with eight cases each (29.60%). It is not surprising to see these two problems being common causes of ICU admissions because preeclampsia/eclampsia and postpartum hemorrhage are among the major causes of maternal mortality and morbidity globally.

The overall frequency of ICU admission in present study were 27 (10%), which were comparatively higher than several studies conducted in similar settings. Madhanure Vanamala *et al.* [13] reported an ICU admission rate of only 1.94% in a tertiary care hospital in India, whilst Bibi *et al.* [14] reported 1.34% from Pakistan and Mufti *et al.* [15] found a rate of 1.49% in Srinagar, India. Shaikh *et al.* [16] from Liaquat University Hospital Pakistan reported a slightly higher rate of 2.1%, and Embu *et al.* [17] reported 2.05% from Nigeria. The higher rate observed in present study may be attributed to the fact that majority of patients 184 (67.9%) were from rural areas with limited access to antenatal care, and 160 (59.0%) belonged to low socioeconomic class, which leads to delayed presentation and more severe complications at the time of admission. In contrast, Abie *et al.* [18] reported a much higher pooled proportion of 17.22% from African studies, which may reflects even greater deficiencies in emergency obstetric care infrastructure across African settings.

Preeclampsia/eclampsia and postpartum haemorrhage were the leading causes of ICU admission in present study, each accounting for 8 cases (29.60%), which were consistent with findings of several other investigators. Castro Apodaca *et al.* [19] from Mexico similarly identified preeclampsia with severity criteria (25.3%) and obstetric haemorrhage (21.7%) as the

commonest diagnoses. Oliveira *et al.* [20] from Portugal also reported hypertensive disorders in 35.5% and obstetric haemorrhage in 24.7% of ICU admissions. Shaikh *et al.* [16] reported hypertensive disorders in 52% and obstetric haemorrhage in 22.8% of cases, whilst Anwari *et al.* [21] from Saudi Arabia noted obstetric haemorrhage in 32% and hypertension in 29% of admissions. These similarities across geographically diverse settings suggests that preeclampsia/eclampsia and haemorrhage remains the dominant drivers of obstetric critical illness universally, owing to their potential to cause rapid multi-organ dysfunction, haemodynamic collapse, and coagulopathy, all of which necessitates intensive level of care.

In contrast, Ebirim *et al.* [22] from Nigeria reported obstetric haemorrhage as the single leading indication accounting for 48 cases, with pregnancy induced hypertension as the second most common cause. Githae *et al.* [23] from Kenya similarly noted haemorrhage as the most frequent cause at 44%, followed by sepsis at 26%. Bibi *et al.* [14] reported hypertensive disorders contributing 50% of admissions, which were higher than present study, and this difference may be related to the fact that 96% of their patients were unbooked and had received no antenatal care, which leads to more severe hypertensive complications at presentation.

Regarding age, ICU admission in present study were significantly more frequent in patients aged more than 30 years 18 (16.1%) compared to younger patients 9 (5.7%), with p-value of 0.005. This finding were supported by Embu *et al.* [17] who also reported that mortality were significantly higher among women older than 35 years, suggesting that advancing maternal age were an independent risk factor for adverse obstetric outcomes. Madhanure Vanamala *et al.* [13] noted a mean age of 27.34 ± 4.8 years, and Oliveira *et al.* [20] reported mean maternal age of 30.3 years, both of which were comparable to mean age of 28.41 ± 6.12 years observed in current study, indicating that obstetric ICU admissions predominantly affects women in their late reproductive years across different populations.

There are various weaknesses inherent in the current research, which must be pointed out. To start with, the study was conducted at one center only, namely, a tertiary care facility. This poses an issue related to the generalizability of the results to a wider population. Furthermore, the sample used in this study was rather small, thus reducing its statistical power. Besides, because of a cross-sectional nature of this study, no causative relationship between demographic characteristics and ICU admission was determined. Another significant aspect is that such crucial variables as antenatal health care utilization, comorbid conditions, and severity scores (SOFA/ APACHE) were not taken into consideration.

CONCLUSION

The present study has concluded that obstetrical ICU admissions were not an uncommon occurrence in tertiary care setting and preeclampsia/eclampsia along with postpartum haemorrhage remains the leading causes of critical illness among obstetric patient.

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