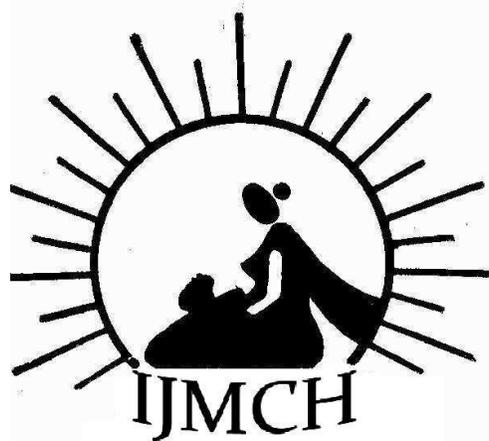Course and Outcome of Critically ill Obstetric Patients in the ICUs of a Tertiary Care Hospital in North India

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To study the spectrum, hospital course, required interventions, maternal mortality in critically ill obstetric patients and to identify the risk factors associated with it.

Course and Outcome of Critically ill Obstetric Patients in the ICUs of a Tertiary Care Hospital in North India

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ABSTRACT:

Research Question: What is the course and outcome of critically ill obstetric patients?

Aims: To study the spectrum, hospital course, required interventions, maternal mortality in critically ill obstetric patients and to identify the risk factors associated with it.

Settings: Medical ICUs

Study design: Retrospective study

Patients: All obstetric patients admitted during the period of March 2008 to March 2009

Results: Out of 29 obstetric patients 22(76%) patients were postpartum, five antepartum and two post abortion. Maternal mortality was 24% (n=7). Five (18%) of the patients had ARDS and 18(63%) patients needed ventilatory support. The mean APACHE II score was 11.8±4.61 with median value of scoring as 12 and predicted mortality of 12%. Among the 7 patients who expired, 3(42.8%) deaths were due to post partum haemorrhage, and one each due to post abortal sepsis, post partum sepsis with renal failure, cerebral venous thrombosis and acute viral hepatitis with fulminant hepatic failure (FHF).

Keywords: Acute physiology and chronic health evaluation (APACHE), Adult respiratory distress syndrome (ARDS), Critically ill, Intensive care unit (ICU), Obstetric, Post partum haemorrhage

INTRODUCTION

Critically ill obstetric patients represent an interesting group with unique characteristics whose management is challenged by altered maternal physiology, presence of foetus and diseases specific to pregnant patients. Admission in intensive care unit (ICU) is required for 0.1-0.9% of obstetric patients (1,2). These patients are admitted to ICU due to multi organ failure, hemodynamic instability, need for ventilatory support and other life support measures. The reported mortality rate of critically ill obstetric patients admitted to ICU ranges from 0-36% in developing and 0-12% in developed countries. (3,4)

The developed countries have well-defined criteria for ICU admission and the mortality rate has declined progressively. Maternal mortality in India is 301 per l00,000 deliveries compared to 12 per 100,000 deliveries in US and 6 per 100,000 deliveries in Canada. (5,6)

In developing countries, the high mortality could be due to poor antenatal and intranatal care, deficient referral services and less number of institutional deliveries. Utilisation of intensive care services remains low in these countries. There is paucity of research work on the need of intensive care management of critically ill obstetric patients, which is also an important aspect of maternal care. Keeping this in mind present study is aimed at studying the spectrum of diseases, associated risk factors, hospital course, required interventions, maternal morbidity and mortality in critically ill obstetric patients admitted in ICU.

PATIENTS AND METHODS

Study area: Forty six bedded medical ICUs of Dayanand Medical College and Hospital, Ludhiana, which is a leading tertiary care hospital of North India.

Study design: Present study is a retrospective analysis of data collected from the medical records of the obstetric patients who were admitted to the ICUs during the period of March 2008 to March 2009. Data collection was done after obtaining approval from hospital ethical committee and a performa was filled noting the patient characteristics, presenting illnesses, complications, interventions required and maternal outcome.

Patients: Patients who were pregnant, post abortion or were in peripartum period with obstetric or non-obstetric illnesses were included in this study.

Analysis of data: The data was analysed with respect to age, parity, antenatal visits, admission diagnosis, complications, associated risk factors, need for ventilatory support and maternal outcome using percentages and chi square test, calculated with Minitab 15 statistical software.

 Definitions:

Shock was defined as a reduction of 40mmHg in systolic BP from baseline despite adequate fluid resuscitation along with presence of perfusion abnormalities like oliguria, lactic acidosis, and acute altered mental status. (7)

ARDS was diagnosed according to American-European Consensus Conference on ARDS. (8)

Sepsis and septic shock were identified by the definition of the American College of Chest Physicians and Society of Critical Care Medicine. (9)

APACHE II Scoring (Acute Physiology and Chronic Health Evaluation) was used to assess the objective assessment of severity of illness in patients in the ICU and estimate the predicted mortality. (10)

RESULTS

During the one year study 2521 patients were admitted to the medical ICUs, out of which 1639 were male patients. Of the remaining 882 female patients admitted to ICUs, 29 admissions were due to obstetric causes, which accounted for 3.3% of female ICU admissions. These obstetric patients formed 1.15% of total admissions in that year in the medical ICUs. (Figure 1)

Figure 1: Distribution of ICU Patients
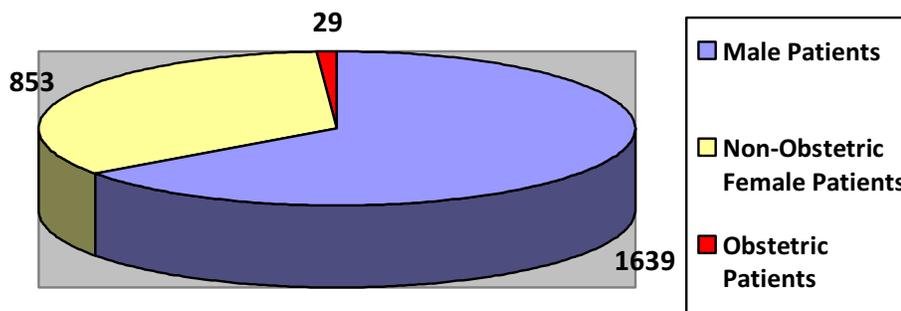
Out of 29 patients, 22 were postpartum, 5 were ante partum and 2 were post abortion. History of regular antenatal checkup was available in only 9 (31%) patients. Age and parity distribution in these patients is as shown in Table I and Table II respectively.

Table I: Distribution of Obstetric Patients with respect to Age

Age (years)	Number of Patients	Mortality N (%)
<18	2	1 (50)
18-21	6	3 (50)
22-25	8	2 (25)
26-29	7	0
30-33	5	1 (20)
>33	1	0
Total	29	7 (24)

Table II: Distribution of the Obstetric Patients with respect to Parity

Parity	Number of Patients	Mortality N (%)
1	4	2 (50)
2	6	2 (33)
3-4	9	2 (22)
5	8	1 (12)
>5	2	0
Total	29	7

$\chi^2 = 0.0255$ p= 0.873 (NS)

Mean age of study group was 24.9±6 years with median age being 24 years (range 15-37 years). Results of comparing age with mortality were not significant. Mean parity of the patients was 3.34±1.5 and median parity was 3 (range 1-6). When parity was compared with respect to mortality, the results were non significant.

Table III shows distribution of patients with respect to admission diagnosis and mortality outcome.

Table III: Distribution of Patients with respect to Admission Diagnosis and Mortality Outcome

Admission Diagnosis	Number of Patients	Mortality N (%)
Postpartum haemorrhage	4	3 (42.8)
Postpartum sepsis	2	1 (14.3)
Acute viral hepatitis with or without FHF	6	1 (14.3)
Blood transfusion reaction	2	0
Cerebral venous thrombosis	4	1 (14.3)
Acute Pancreatitis	1	0
Eclampsia	1	0
Seizure disorder	1	0
Anaesthesia (High spinal)	1	0
Viral encephalitis	1	0
Dengue with related complications	2	0
Cerebral malaria	1	0

Post abortion sepsis	2	1 (14.3)
Neurocysticercosis with seizures	1	0
Total	29	7

Common admission diagnosis of the patients were acute viral hepatitis with or without fulminant hepatic failure (FHF) n=6(27%), postpartum haemorrhage n=4(18%), and cerebral venous thrombosis n=4(18%). Less common diagnosis were postpartum sepsis with renal failure with ARDS, postpartum blood transfusion reaction leading to DIC, hypertension with eclampsia, seizure disorder, pancreatitis with acute renal failure and ARDS, and anaesthesia related complication, etc. Viral and parasitic infections including acute viral hepatitis, dengue, malaria and neurocysticercosis were responsible for 34.4 % (n=10) of admissions in ICU in the study group. Overall mortality in the study group was 24% (n=7) (Table III). Three patients of post partum haemorrhage (42.9%) formed the major group contributing in mortality followed by one patient each with a diagnosis of postpartum and post-abortal sepsis, cerebral venous thrombosis, and acute viral hepatitis.

Table IV: Relationship between Organ failures and Mortality

Organ failure	Number of Patients* (n= 29) (%)	Mortality* N (%)
Respiratory	13(44.8)	7(53.8)
Renal	12(41.3)	5(41.7)
Hemodynamic/Cardiovascular	16(55.1)	7(43.8)
Neurological	15(51.7)	4(26.7)
Hepatic	11(38)	2(18.2)
Haematological	17(58.6)	6(35.3)

*Total adds up to more than 100% as some patients had multiple organ involvement.

As is clear from the Table IV, patients had haematological (58.6%), neurological (51.7%), hemodynamic (55.1%), respiratory (44.8%) and renal failure (41.3%). Mortality was highest in patients with respiratory failure (53.8%), hemodynamic or cardiovascular instability (43.8%) and renal failure (41.7%).

All the patients who expired (n=7) had respiratory failure and hemodynamic instability, six patients had haematological failure in the form of anaemia, raised TLC, coagulopathy and thrombocytopenia and five had renal failure.

Table V shows distribution of patients with respect to number of organ failures and relation with mortality. As is clear from the table higher the number of organ systems involved, higher is the mortality.

Table V: Distribution of Patients with respect to Number of Organ Failures and relation with Mortality

No. of Organ Failures	Number of Patients	Mortality N (%)
1	9	0
2	3	0
3	7	1(14.3%)
4	4	2(50%)
5	4	2(50%)
6	2	2(100%)

Table VI shows relation of ARDS and non-ARDS patients with mortality. On comparing mortality in ARDS and non-ARDS patients, results were found to be highly significant (p=0.001) for ARDS patients.

Table VI: Relation of ARDS and Non-ARDS Patients with Mortality

ARDS	No. of Patients	Mortality N (%)
No	24	3(12.5)
Yes	5	4(80)
Total	29	7

χ^2=10.296, d.f=1, p =0.001(HS)

Fischer's exact test p value=0.006(HS)

Table VII shows relation of APACHE II Score with mortality in patients admitted to ICU. Mean APACHE II score was 11.8±4.616 in the study group, with a range of 6-20 and median value of 12. As is clear from the table, higher the APACHE II score, more was the mortality in the study subjects.

Table VII: Relation of APACHE II Score with Mortality

APACHE II Score	No. of Patients	Mortality N (%)
5-8	9	0
9-12	10	1 (10)
13-16	4	2 (50)
17-20	6	4(66.6)
Total	29	7

Table VIII shows relation of causes of admission of obstetric patients to ICU with mortality. Mortality in patients admitted with obstetric complications (n=10) was found to be 50% while those admitted with non-obstetric complications (n=19) was found to be 10.5% and this difference was found to be statistically significant.

Table VIII: Distribution of Obstetric Patients with respect to Cause of admission and relation with Mortality

Cause of Admission	No. of Patients	Mortality N (%)
Non-obstetric complication	19	2(10.5%)
Obstetric complication	10	5(50%)
Total	29	7(24.1%)

χ^2 =5.575, d.f=1, p =0.018 (significant),

Fischer's exact test p value=0.0302 (significant)

Table IX: Relation of Ventilated and Non-ventilated Patients with Mortality

Ventilatory support	No. of Patients	Mortality N (%)
No	11	0
Yes	18	7(38.8%)
Total	29	7

Out of total 29 study subjects, ventilatory support was needed in 18 patients out of whom, 7 patients could not survive. (Table IX)

DISCUSSION

In the present study, obstetric patients accounted for 1.15 % of total ICU admissions which is low as compared to other studies done in developed countries. In a study, obstetric patients (n=125) represented 2.64% of all intensive care unit admissions (11). This shows an underutilisation of intensive care services and lack of awareness in general public. Antenatal check up in the present study was found in only 9(31%) patients which is quite low than the figures quoted in NFHS-3 (77%). (12)

Majority of admissions (76%) were due to the postpartum complications which is consistent with other studies. Common admission diagnosis of the patients included viral and parasitic infections including acute viral hepatitis, dengue, malaria and neurocysticercosis, postpartum haemorrhage and cerebral venous thrombosis, whereas, other studies had found pregnancy-induced hypertension and hemorrhage as common ICU admission diagnosis for obstetric patients. Infections (viral, parasitic and bacterial) formed a major group in the present study in contrast to other studies. (7,13)

Overall mortality in the study group was 24% (n=7) which is consistent with mortality rate of 0 to 36% in developing countries (3,4) but is more than the mortality found in western studies (7,13). Three patients of post partum haemorrhage (42.9%) formed the major group contributing in mortality followed by one patient each with a diagnosis of postpartum and post-abortal sepsis, cerebral venous thrombosis, and acute viral hepatitis in our study. Mortality was highest in patients with respiratory failure (53.8%), hemodynamic or cardiovascular instability (43.8%) and renal failure (41.7%).Comparison with other studies is shown in the Table X.

Table X: Comparison with Other Studies (6,14,15)

Study	N	Antenatal Care	Median APACHE II	Renal Failure	Resp. Failure	Vent. Support	Mortality
Munnur U et al, KEMH, Mumbai, 2005 (6)	754	27%	16	50%	59%	-	25%
Munnur U et al, General Hospital, Houstan, 2005 (6)	174	86%	10	37%	46%	-	2.3%
Afessa B et al, 2001 Mayo Clinic (14)	74	-	15	-	-	45%	2.7%
Osinaike BB et al,2006 Ibadan(15)	70	21.4%	-	-	55%	27%	52%
Present study	29	31%	12	41.3%	44.8%	62%	24%

ARDS was seen in five patients (17.2%) in the present study which is comparable to 15% and 19% found in other studies (14, 7). On comparing mortality in ARDS and non-ARDS patients, results are highly significant (80%) for ARDS patients in present study.

Though some studies have cited that APACHE II scores cause falsely elevated predicted mortality rates (7,14), but Koch et al (16) found that actual mortality was higher than the predicted mortality which is also consistent with the findings of the present study where median APACHE II score was 12 with a predicted mortality of 12% but actual mortality was 24%. Yet another study showed no significant difference between the actual and predicted

mortality (17). This puts a question on the prognostic value of APACHE II scoring to predict mortality in this particular subgroup of obstetric patients. (14)

All the seven patients had respiratory failure and hemodynamic instability. High predictors of mortality were respiratory failure (100%), hemodynamic instability (100%), hematological failure (anemia, raised TLC, coagulopathy and thrombocytopenia) (85.7%), renal failure (71.4%), multi organ failure (50-100%). Duration of ICU stay did not have any significant relation with the mortality.

This study has certain limitations. First, it has a retrospective design. Second, duration of study is one year and as a result the sample size is small. Finally, this study is conducted in a single center and multicentric study may help in a better way to draw conclusions.

CONCLUSIONS

Utilization of intensive care unit services is still low. Poor antenatal care may have considerable effect on obstetric complications and high mortality. Patients admitted to ICU have varied type of admission diagnosis but postpartum complications especially hemorrhage is associated with poor outcome. Intensive care specialists should be familiar with these complications of pregnancy and should work closely with obstetricians.

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