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Study of Clinical Profile and Outcome of Patients admitted in a Obstetric ICU of a Tertiary Care Hospital

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Abstract

Objective : To analyse indications and clinical profile of obstetrics patient for admission in obstetric ICU and to observe outcome of patients.
Methods : The prospective observational study was designed to evaluate the maternal mortality ratio in a tertiary care hospital for 1 year to assess the demographic profile, causes of maternal mortality, type of delay, and to suggest remedial measures for improvement. **Results:** In our study, the main obstetric reason for ICU admission was hypertensive disorders of pregnancy which constitute 314(36.09%), the majority of which were complicated by severe anaemia (6.20%) followed by obstetric haemorrhage in 288(33.10%). The maternal mortality rate in our study was 11.95% among patient admitting to obstetric ICU. Most common underlying condition leading to death of patients was hypertensive disorders (61.85%). **Conclusion** Establishment of a dedicated obstetric ICU at tertiary care centre with knowledge, familiarity and experience of an obstetrician and a special team would be best place to monitor and treatment for critically ill patients, which will reduce the maternal morbidity and mortality. Mortality rate may be reduced by health education, training staff at primary health care centre to identify womens at high risk, early referrel to tertiary care centre where facilities for ICU are available.
Keywords: Intensive Care Unit, maternal outcome, obstetric patient, severe acute maternal morbidity.

Introduction

Intensive care unit is a specialized area of hospital which is specifically designed, staffed, located, furnished and equipped dedicated to management of critically ill patient. The concepts and development of critical care began in the 1960"s. The National institute of health had its first consensus conferences of this subject in 1983. In 1988, the society for critical care medicine established guidelines for intensive care units.[1]

Critically ill patients are those who have acute life-threatening complications. Manifestation of critical illness are circulatory failure or shock, respiratory failure, renal failure, disseminated intravascular coagulation coma and septicemia. Once identified, they have to be transported to intensive care unit finally which is life saving for many patients.[2]

Pregnant patient account for up to 10% ICU admission in developing countries.There are certain issues related to alteration of maternal physiological parameters and interaction of these parameters with disease processes, which pose threat to both pregnant women and her baby. Hence these women need special units to monitor and to treat complications arising from disease during peripartum period.[3]

Care of critically ill patients is an important aspect of obstetric services delivered in a tertiary care hospital. If adequate care is provided to critically ill obstetric patients in time, many morbidities and mortalities can be avoided.Each year throughout the world approximately 8 millions women suffer from pregnancy related complications and over a half million will die.The common reason for admission in obstetrics ICU are Obstetric Haemorrhage, toxaemia of pregnancy, Anaemia, septicaemia, pulmonary embolism. Majority of these conditions are preventable. When complications arises, early intervention and treatment on a multidisciplinary basis which may involve ICU admission, can alleviate progression of organ dysfunction and improve prognosis.[4,5]

Materials and Methods

The study was conducted in Department of Obstetrics and Gynaecology , Gandhi Medical College, Sultania Zanana Hospital, Bhopal .
Study Design: Prospective observational study
Study Duration One year (1 December 2019 to 30 November 2020)

Inclusion Criteria

All obstetric cases admitted to ICU during pregnancy and six weeks post partum.

Exclusion Criteria

All cases admitted to obstetric ICU beyond 6 weeks postpartum with any medical or surgical complication.Patient with gynaecological disorder admitting to ICU.

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Sample Size
All obstetric cases admitted to ICU during study period fulfilling the inclusion criteria.
Consent
Informed consent was taken as per the standard procedures in the institution .

Ethical Clearance
Obtained from the ethical committee of Gandhi medical college Bhopal.

Procedure: All cases admitted to Obstetric ICU in one year according to inclusion criteria were included in the study. After taking written informed consent the data was collected according to the predesigned proforma. A detailed history taking, general physical examination and obstetric examination was done. Routine Investigations like CBC, Blood Group, Peripheral Blood Smear,

Coagulation Profile, Liver Function Test, Renal Function Test, Serum Electrolyte, Urine Routine Microscopy, Swab Culture were sent & Arterial blood gas analysis was done in ICU with heparinised arterial blood sample with blood gas analyser. The extracted data included, maternal age, booking status, locality of patients, education status, duration of ICU stay, mode of delivery, indications of ICU admission, coexisting medical problem, any procedure or intervention involving advance life support and maternal outcome

Observation Chart
This is prospective observational study, conducted in the Department of obstetric and gynaecology, sultania zanana hospital, Gandhi medical college, Bhopal from 1st December 2019 to 30 November 2020 over a period of one year.
During the study period,Total obstetric admission 20061
Total obstetric ICU admission : 870 Obstetric ICU admission rate : 3.48%

Table 1: Distribution According To Age

Age	No. Of Cases (n=870)	Percentage
18-20	118	13.56
21-25	540	62.06
26-30	177	20.34
31-35	31	3.56
>35	4	0.45

Table 1 shows the distribution according to age. It was found that majority of the obstetric patients in ICU had age between 21-25 years (62.04%) followed by 26-30 years (20.34%).Mean age was 28.5 years.

Table 2: Parity of Patients Admitted To ICU

Parity/gravidity	No of Cases (n = 870)	Percentage
Primi	320	36.78
Multi	488	56.09
Grandmulti	62	7.13
Total	870	100

Table 2 shows the parity of patients admitted to ICU. It was found that majority of the obstetric patients were multipara (56.09%) followed by primi (36.78%).

Table 3: Distribution of Patients According To Booking Status

Booking status	No. Of Cases (n = 870)	Percentage
Booked	18	2.06
Unbooked	122	14.02
Referred	730	83.90
Grand Total	870	100

Table 3 shows the distribution of patients according to booking status. It was found that majority of the obstetric ICU patients were referred (83.90%) whereas 14.02% of the women were unbooked.

Table 4: Distribution of Patients According to Education Status of Patients

Education	No. Of Cases (n = 870)	Percentage
Illiterate	340	39.08
Up to 5th class	452	51.95
High school	78	8.97
Grand Total	870	100.00

Table 4 shows the distribution of patients according to education status of patients. It was found that majority of the obstetric ICU patients had education up to 5th class (51.95%) whereas 39.08% were iilliterate and only 8.97% had education till high school.

Table 5: Distribution of Patients according to Status of Pregnancy

Status of pregnancy	No. Of Cases (n=870)	Percentage
Antepartum	106	12.18
Intrapartrum	38	4.37
Post partum	690	79.31
Postabortal	15	1.72
Ectopic	21	2.41
Grand Total	870	100

Table 5 shows the distribution according to status of pregnancy. It was found that majority of the obstetric ICU patients were in the postpartum period (79.31%) followed by antepartum period (12.18%).
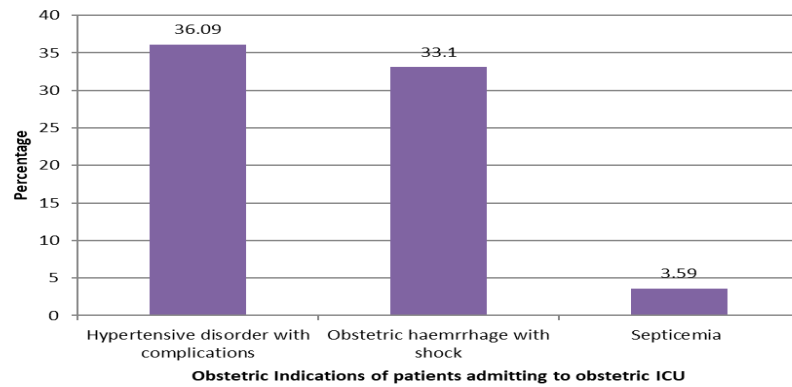
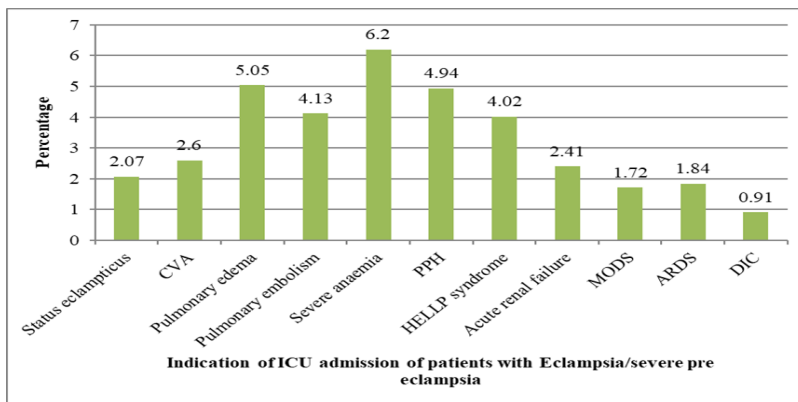**Fig 1:Obstetric indications of patients admitting to obstetric ICU**

Fig 2:Indication of ICU admission of patients with Eclampsia/severe pre eclampsia
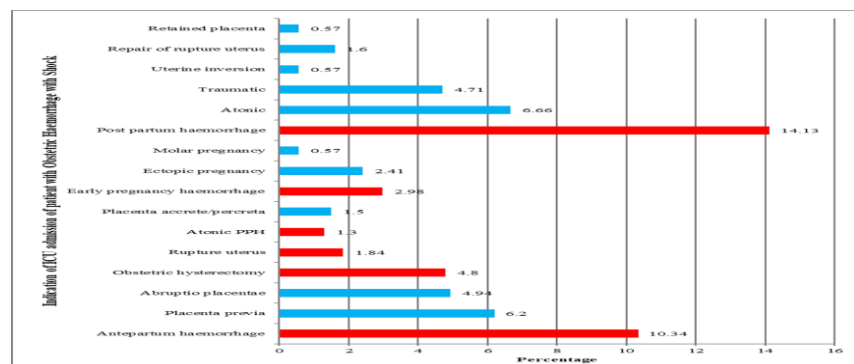

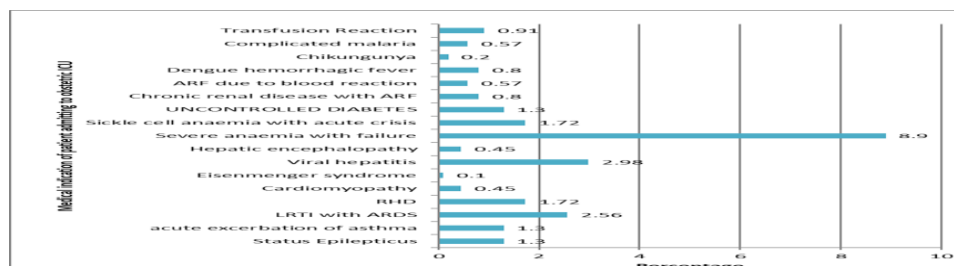**Fig 3:Indication of ICU admission of patient with obstetric haemorrhage with shock versus percentage**

Fig 4:Medical indications of patient admitting to obstetric ICU

Table 6: Distribution of Patients According To ICU Stay

Duration of stay (day)	No of Cases (n=870)	Percentage
<1	42	4.8
1-3	610	70.11
4-6	208	23.90
7-12	8	0.91
>12	2	0.2
Total	870	100

Table 6 shows the distribution of patients according to duration of ICU stay. It was found that majority of the patients in obstetric ICU had ICU duration of 1-3 days (70.11%) followed by 4-6 days (23.90%).Mean duration of ICU stay was 3.4 days.

Table 7: Distribution of Patients According To Intervention Done In ICU Patients

Intervention	No of cases	Percentage
Advanced monitoring	870	100
Use of vasoactive drugs	293	33.67
Use of blood component	630	72.41
Mechanical ventilation	154	17.70
Renal dialysis	15	1.72

Table 8: Distribution of Patients According To Obstetric Intervention

Obstetric Intervention	Number of Cases	Percentage
Vaginal delivery	134	15.40
LSCS	611	70.23
Bakri balloon insertion for PPH	178	20.45
Laparotomy	66	2.41
.Ectopic	21	
Obstetric hysterectomy	42	4.83
Abdominal exploration		
	3	0.34
MVA for RPOC	15	1.72
S & E for vesicular mole	12	1.38
Undelivered	32	3.67

Table 9: Distribution of Patients According To Cause of Death

Causes of death (n=97)		Frequency	Percentage
Hypertensive disorders (n=60)	Cerebrovascular accident	21	20.19
	Pulmonary edema	15	16.35
	Pulmonary embolism	13	13.46
	Multi organ dysfunction syndrome	3	2.88
	Disseminated intravascular coagulopathy	2	2.88
	ARDS	4	5.77
	ARF	2	1.92
Haemorrhagic shock (n=08)	Atonic PPH	4	5.77
	Rupture uterus	3	3.85
	Rupture ectopic	1	0.96
Severe anaemia	Congestive cardiac failure	18	17.31
LRTI	ARDS	06	7.69
Heart disease	Cardiac Failure	2	1.92
Post abortal Sepsis		2	1.92
PNC day 15 with disseminated ovarian malignancy		1	0.96

Results

Present study observed obstetric ICU admission rate of 3.48%.In our study, the mean age was 28.50 years. The

maximum number of patients were in the age group 20-25 years (62.04%).In this study, multiparous women constituted 56.09% followed primiparous women who accounts for 36.78% of total obstetric admission.In our study, majority of obstetric ICU patients were referred (83.90%) whereas 14.02% were unbooked and only 2.06% patients were booked at our hospital.In present study, out of 870 patients, 566 patients (66%) resides in rural area and 304 patients (34%) resides in urban area.In our study, majority of patients had education upto 5th class (51.95%) whereas 340 patients (39.08%) were illiterate.In our study,Majority of patients were admitted in post partem period, 690(79.31%).

In our study, the main obstetric reason for ICU admission was hypertensive disorders of pregnancy which constitute 314(36.09%) , the majority of which were complicated by severe anaemia (6.20%) followed by obstetric haemorrhage in 288(33.10%).In our study, Preexisting medical illness were present in 27.12% of patients (236). Most common cause was hematological disorder (10.62%) .The mean length of ICU stay was 3.4 days with a range of 1 -12 days. It was found that majority of patients had ICU stay of 1-3 days(70.11%).

In our study, advance monitoring was done in 100% patients, 630 patients (72.41%) required blood components. mechanical ventilation was required in 154 patients (17.70%) and renal dialysis in 15 patients (1.72%).The most common mode of delivery was caesarean section in 611 cases(70.23%).The maternal mortality rate in our study was 11.95% among patient admitting to obstetric ICU. Most common underlying condition leading to death of patients was hypertensive disorders(61.85%)

Statistical Analysis

Data was compiled using MS excel 2007 and analysis was done with the help of Epi-Info 7 software. Qualitative statistics of both groups were compared using Pearson's Chi-square test and Fisher's exact test. Odds ratio was calculated for significant factors. Frequency and percentage were calculated & statistical test (Chi Square) was applied wherever applicable; $p<0.05$ was taken as statistically significant.

Discussion

The critically ill obstetric patient represents a challenge that usually requires a multidisciplinary approach. Lack of awareness and the absence of regular antenatal care make the critically ill patients to be referred late and sometimes in moribund conditions. The objective of the present study is to determine the incidence, predictors and outcome of obstetric ICU admissions.

Panda SR et al did a retrospective analysis on clinical profile of obstetric patients getting admitted to ICU in a tertiary care center having HDU facility. This study was conducted over a period of 2 year at Institute of Medical Sciences, BHU, Varanasi, India. Maximum number of patients were admitted for a period of 4–7 days. Blood transfusion (64.1%), the use of inotropic drugs (45.6%), central line placement (44.5%) and mechanical ventilation (26.08%) were the major interventions performed in ICU. Obstetric hemorrhage was found to be the most frequent

clinical diagnosis leading to ICU admission (31.5%) followed by hypertensive disorders (25%).In addition to timely referral, health education and training of health professionals may improve clinical outcome and better obstetric practice, especially in countries like India. Obstetric ICU dedicated for the management of only obstetric patients should be constructed in order to compensate for heavy burden critically ill women.[6]

Critically ill obstetric patients constitute a small number of intensive care unit (ICU) admissions. Physiological changes in pregnancy along with certain pregnancy-specific diseases may cause a rapid worsening of the health status of the patient necessitating ICU care. The retrospective study by Gupta H, Gandotra N et al aims to study the clinical profile of the obstetric patients requiring ICU care.Maternal and child health has become an important measure of human and social development. Early diagnosis and prompt treatment of high-risk obstetric patients in a dedicated obstetric ICU in tertiary hospitals can prevent severe maternal morbidity and improve maternal care. Similar studies were done by Saif KM et al in their prospective study and Jha S et al in a retrospective study to assess the incidence, clinical profile of antenatal and postpartum women requiring admission to the ICU. All said studies have findings similar to ours.[7-9]

A comparative study was done by Jain S, Guleria K et al on predictors and outcome of obstetric admissions to Intensive Care Unit .This descriptive observational study was carried out in Guru Teg Bahadur Hospital to identify predictors and outcome of obstetric admission to Intensive Care Unit (ICU). Ninety consecutive pregnant patients or those up to 42 days of termination of pregnancy admitted to ICU from October 2010 to December 2011 were enrolled as study subjects with selection of a suitable comparison group. Low socioeconomic status, duration of complaints more than 12 h, delay at intermediary facility, and peripartum hysterectomy increased probability of admission to ICU. High incidence of obstetric admissions to ICU as compared to other countries stresses on need for separate obstetric ICU. Availability of high dependency unit can decrease preload to ICU by 5%. Patients with hemorrhagic disorders and those undergoing peripartum hysterectomy need more intensive care.[10]

Kumar C, Kumar N et al did another observational study to evaluate the incidence, clinical profile of antenatal and postpartum women requiring admission to the ICU and the interventions required. Data were recorded and analyzed for each patient: age, parity, primary diagnosis (obstetric or non-obstetric e.g. community-acquired pneumonia, rheumatic heart disease) responsible for the patient's critical illness, indication of ICU admission, obstetric interventions performed, critical care interventions performed during ICU stay (mechanical ventilation, central venous catheterization, invasive arterial pressure monitoring, hemodialysis), duration of mechanical ventilation, length of ICU stay and outcome of patient.The main obstetric indications for ICU admission were pregnancy-induced hypertension (15%) followed by obstetric haemorrhage (9%) and community acquired pneumonia (7%), Other indications were valvular heart disease (5%) and monitoring (6.5%). In the present study maternal mortality among the women admitted to ICU was

16%. The leading cause of maternal death was obstetric haemorrhage (28.13%) followed by pregnancy induced hypertension (21.87%). An ICU intervention during the stay of the patients in terms of mechanical ventilation was used in 135 (67.5%) cases. They like us concluded that a high quality multidisciplinary care is required in complicated pregnancies for safe motherhood. So, there is a need for dedicated ICU for obstetric patients.[11]Pregnancy is associated with physiological and anatomical changes that usually occur uneventfully in majority of women. However, these changes can cause major maternal morbidity with potential catastrophic consequences. Orsini J et al studied clinical profile of obstetric patients admitted to the medical-surgical intensive care unit (MSICU) of an inner-city hospital in New York. The most common comorbidity on admission was hypertensive disorder. Hemodynamic unstability and shock was the most common admission diagnosis. The mean length of stay was 3.5 days. One patient died. They concluded that obstetric hemorrhage and pregnancy-induced hypertensive disorders remains as the most common entities requiring intensive care unit (ICU) admission among obstetric patients. A multidisciplinary team involvement is essential in the management of these patients.[12]Clinical profile and outcome of obstetric ICU patients by APACHE II, SOFA, SAPS II and MPM scoring systems for prediction of prognosis was done by Devabhaktuni P et al.A prospective, observational study was conducted among all the obstetric patients admitted to the ICU between October 2011 and December 2012, during a period of 15 months. The data collected were of three categories: demographic, obstetric and ICU related. The mortality prediction scores were calculated for 41 patients only as acid blood gas analysis was not available for the rest. Patients required ventilation—51.92%, hemodialysis—19.23%, inotropic support—38.46%, blood transfusion—50%. Among the obstetric ICU admissions, hypertensive disorders of pregnancy (30.76%) was the predominant cause followed by obstetric haemorrhage (23.07%). A reduction in mortality of 40% has been achieved due to intensive care. To conclude , leading cause of maternal mortality was HELLP syndrome. Hypertensive disorders of pregnancy were the most common cause of admission to ICU. In this study, all the scores were equally significant in predicting maternal mortality. [13]

Maternal mortality ratio (MMR) is still high in many developing countries. In Southern India, the maternal mortality is highest in the state of Karnataka. Therefore, a study was conducted at BLDE (DU) Shri BM Patil medical college, hospital and research centre to study the causes of maternal deaths, and to make recommendation to reduce the maternal mortality. Conclusions of the study were that timely intervention can save maternal lives. Services of well-equipped hospitals with obstetric intensive care units having a dedicated team of well-trained obstetricians, intensivists and anaesthesiologist are recommended in a facility which is near the residence of the pregnant women. Facilities for quick transfer of the cases who are high risk are required.[14]

A retrospective study was done by Mittal P et al at a tertiary care hospital in New Delhi. The medical records of all maternal deaths over a period of 4 years were reviewed and analyzed. The study was designed to evaluate the maternal mortality ratio in a tertiary care hospital, assess the demographic profile, causes of maternal mortality, type of delay, and to suggest remedial measures for improvement. Most maternal deaths were due to direct causes like hypertensive disorders (28.02%), pregnancy-related infections (20.87%), and hemorrhage (12.36%). Among indirect causes, anemia, hepatitis, heart disease and respiratory illness accounted for 15.93, 11.53, 3.29 and 5.49%, respectively. Type I delay was most common (64.28%). Strengthening of the peripheral centers, hiring competent staffs and adequate blood bank facilities together with reference linkages must be done. Auditing the causes for maternal mortality is extremely helpful to identify the preventable causes and delays.[15]

Conclusion

Present study of clinical profile and outcome of obstetric icu patients in a tertiary care hospital showed that 3.48% patients required obstetric ICU admission. Multiparity, no antenatal visits, rural residence, lack of education were associated with poor outcome. Hypertensive disorder and obstetric haemorrhage are the major risk factors for ICU admission. Most common condition leading to death of the patients is hypertensive disorders of pregnancy complicated by CVA, pulmonary edema, pulmonary embolism, MODS, AKI, HELLP syndrome.

References

1. Dasari P. Maternal mortality and its relationship to emergency obstetric care (EmOC) in a tertiary care hospital in South India. Obstetric medicine. 2015; 8(2):86-91.
2. Karnad DR, Lapsia V, Krishnan A, Salvi VS. Prognostic factors in obstetric patients admitted to an Indian intensive care unit. Critical care medicine. 2004; 32(6):1294-9.
3. Bhat PB, Navada MH, Rao SV, Nagarathna G. Evaluation of obstetric admissions to intensive care unit of a tertiary referral center in coastal India. Indian journal of critical care medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine. 2013; 17(1):34.
4. Gombar S, Ahuja V, Jafra A. A retrospective analysis of obstetric patient's outcome in intensive care unit of a tertiary care center. Journal of anaesthesiology, clinical pharmacology. 2014; 30(4):502.
5. Tayade S, Gangane N, Shivkumar P, Baswal D, Ratnu A. Role of Obstetric High De-pendency and Intensive Care Unit in Improving Pregnancy Outcome and Reducing Maternal Mortality-A Study in Rural Central India. Int J Crit Care Emerg Med. 2018; 4:055.
6. Panda SR, Jain M, Jain S. Clinical profile of obstetric patients getting admitted to ICU in a tertiary care center having HDU facility: a retrospective analysis. The Journal of Obstetrics and Gynecology of India. 2018; 68(6):477-81.
7. Gupta H, Gandotra N, Mahajan R. Profile of Obstetric Patients in Intensive Care Unit: A Retrospective Study from a Tertiary Care Center in North India. Indian

Journal of Critical Care Medicine: Peer-reviewed, Official Publication of Indian Society of Critical Care Medicine. 2021; 25(4):388.

8. Saif KM, Tahmina S, Maitree P. A prospective study of clinical profile and outcome of critically ill obstetric patients in ICU at a tertiary level hospital in India. Anaesth Pain & Intensive Care. 2013; 17(3):243-7.

9. Jha S, Kumar B, Bharati K. A Retrospective Study to assess the incidence, clinical profile of antenatal and postpartum women requiring admission to the ICU. European Journal of Molecular & Clinical Medicine. 2021; 7(9):3683-9.

10. Jain S, Guleria K, Vaid NB, Suneja A, Ahuja S. Predictors and outcome of obstetric admissions to Intensive Care Unit: A comparative study. Indian journal of public health. 2016; 60(2):159.

11. Kumar C, Kumar N. An observational study to evaluate the incidence, clinical profile of antenatal and postpartum women requiring admission to the ICU and the interventions required. European Journal of Molecular & Clinical Medicine. 2021; 7(10):3690-6.

12. Orsini J, Butala A, Diaz L, Muzylo E, Mainardi C, Kastell P. Clinical profile of obstetric patients admitted to the medical-surgical intensive care unit (MSICU) of an inner-city hospital in New York. Journal of clinical medicine research. 2012; 4(5):314.

13. Devabhaktuni P, Samavedam S, Thota GV, Pusala SV, Velaga K, Bommakanti L, Nawinne M, Thomas P. Clinical profile and outcome of obstetric ICU patients. APACHE II, SOFA, SAPS II and MPM scoring systems for prediction of prognosis. Open Journal of Obstetrics and Gynecology. 2013.

14. Yaliwal RG, Biradar AM, Kori SS, Mudanur SR, Pujeri SU, Sushmita J. Why do mothers die? A retrospective analysis of maternal mortality over 7 years in a tertiary care teaching Hospital in North Karnataka, India. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2020; 9(11):4665-70.

15. Mittal P, Kapoor G, Kumari N, Bajaj B. Review of Maternal Mortality at a Tertiary Care Hospital: What Have we Achieved?. The Journal of Obstetrics and Gynecology of India. 2019; 69(2):149-54.