

ORIGINAL RESEARCH

Clinical profile of respiratory distress in obstetric admissions to intensive care unit at a tertiary care centre in northern India

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ABSTRACT

Respiratory distress is the most common complaint of obstetric women admitted to ICU. The incidence of acute respiratory distress in pregnancy necessitating mechanical ventilation is 0.1 to 0.2%. This study was planned to identify risk factors and diseases which lead to ICU admission in respiratory distress and morbidity and mortality associated with these women. All antenatal women with respiratory distress after 20 weeks of gestation and after delivery up to 6 weeks who required intensive care and were shifted to ICU included in the study. The majority of women in the present study were in age group 21 to 30 years, multiparous, and from a rural background. Respiratory distress predominantly occurred in women in the antenatal period, 35.24% were in the postpartum period. The mode of delivery was caesarean section is 48 (60.75%) women and only 16 (20.25%) women delivered vaginally. All causes of respiratory distress were categorized into Obstetrical (61.47%) and Non-obstetrical (38.52%) causes. The obstetrical causes were pre-eclampsia (44%), eclampsia (25.33%), postpartum haemorrhage (8%), hemoperitoneum 2.66% (one with splenic rupture, one with coagulation dysregulation), placental abruption (6.66%), twin pregnancy (10.66%) and obstructed labour (2.66%). The non-obstetrical causes were included sepsis 19 (40.42%), respiratory disease (23.40%), heart disease 5 (10.63%), Jaundice 7(5.73%), Dengue shock syndrome (4.25%), seizure disorder (4.25%) and guillain barre syndrome (2.12%). Respiratory distress and ICU admission are one of the key indicators of maternal morbidity and mortality. To reduce maternal mortality, it is essential to identify risk factors earlier in pregnancy and further strengthening of the healthcare system from head to toe, starting from primary healthcare units to tertiary healthcare services including ICU facilities.

Key words - Pregnancy, Respiratory distress, Intensive care unit, Antenatal period, postpartum, Obstetrical.

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INTRODUCTION

Respiratory distress is the most common indication for intensive care admission in obstetric women.¹ Admission to the ICU with respiratory distress during pregnancy and postpartum period is the hallmark of severe morbidity and mortality in antenatal women. The incidence of ICU admission during pregnancy and the postpartum period was found to be between 0.7 to 13.5%.^{1,2} Acute respiratory distress in pregnancy requiring mechanical ventilation is 0.1 to 0.2%.^{3,4} Pregnancy is the state of physiological changes. There are significant physiological changes in pregnancy and the postpartum period. The elevation of the diaphragm, a 20% reduction in functional reserve capacity, decreases in both the expiratory reserve volume and residual volume and a 9.5% -25% decrease in total residual capacity occurs in pregnancy.^{3,4,5} So clinicians should understand the

physiological changes in pregnancy, and identify women with already compromised respiratory system and obstetrical high-risk factors that may result in respiratory distress. This study aimed to identify risk factors and diseases that result in ICU admission due to respiratory distress, as well as the related morbidity and mortality in these women. Ethical clearance will be obtained from the institutional ethical committee (Research Project Advisory Committee with ethical number UHSR/RPAC/2023/258 dated 01/04/2023)

MATERIALS AND METHODS

A prospective observational study was conducted in the Department of Obstetrics and Gynaecology at Postgraduate Institute of Medical Sciences, Rohtak, Haryana which is a tertiary care institute with the availability of well-equipped modular ICU facilities receiving referral cases from all over the state. This

prospective study was conducted over the period of eighteen months from 1st April 2023 to 30th September 2024. All antenatal women with respiratory distress after 20 weeks and after delivery up to 6 weeks admitted to labor ward, who required intensive care and shifted to ICU were included in the study. A well informed written consent was taken from every women under study and relative in case of unconscious patients. The institutional ethical committee number was obtained. Details of women

under study recorded in proforma by principal investigator of study. Demographic details of women in terms of age, residence, socioeconomic status were noted. Antenatal history in terms of chief complaints, Obstetric history, history of any chronic illness was taken. The cause of respiratory distress noted, delivery details like mode of delivery, any intra-partum or postpartum complications were noted. The causes of ICU admission were classified into obstetric and non-obstetric causes.

RESULTS

Parameters	No of women N=122	Percentage (%)
Age Group		
<20 years	5	4.09%
21-30 years	71	58.19%
31-35 years	40	32.78%
>35 years	6	4.91%
Residential status		
Rural	85	69.67%
Urban	37	30.32%
Parity		
Primigravida	50	40.98 %
Multiparous	82	67.21 %
Time of presentation		
Antenatal period	79	64.75 %
Postpartum period	43	35.24%
Mode of delivery		
	N=79	
Vaginal	16	20.25%
Caesarean	48	60.75 %

A total of one hundred twenty-two women with respiratory distress were admitted to the ICU during the study period. Out of these 79 (64.75%) were antenatal period and 43 (35.24%) were in the postpartum period. Table 1 showed the demographic characteristics including age group, residence, parity, time of presentation and mode of delivery. The majority of women in the study, 71 (58.19%) women

were in age group from 21 to 30 years. 69.67% women belonged to rural areas and 30.32% lived in urban areas. The majority of women in the study were multiparous 67.21% and 40.98 % were primigravida. The mode of delivery was caesarean section in 48 (60.75%) women and only 16 (20.25%) women delivered vaginally.

Obstetrical causes			Non - obstetrical causes		
Causes	No. of women(n=75)	Percentage	Causes	No. of women (n=47)	Percentage
Pre-eclampsia	33	44%	Sepsis	19	40.42%
Eclampsia	19	25.33%	Respiratory disease	11	23.40%
APH (placental abruption)	5	6.66%	Heart disease	5	10.63%
Twin Pregnancy	8	10.66%	Jaundice	7	14.89%
Post postpartum hemorrhage	6	8%	Dengue shock syndrome	2	4.25%
Hemoperitoneum	2	2.66%	Seizure disorder	2	4.25% %
Obstructed labour	2	2.66%	GBS	1	2.12%

The Obstetrical and Non-obstetrical causes of respiratory distress in the study group is shown in Table 2. Out of total 122 women, 75 women had

respiratory distress due to Obstetrical causes and 47 were admitted to ICU because of Non-obstetrical causes. Among obstetrical causes, the most common

cause was hypertensive disorders of pregnancy found in 52 women. Severe pre-eclampsia was noted in 33 (63.46%) women and 19 (36.53%) were admitted due to eclampsia. The complications in women with severe pre-eclampsia were pulmonary oedema (51.51%), peri-partum cardiomyopathy (PPCM) (6.06%), thrombocytopenia (6.06%), intracranial hemorrhage (3.03%), ascites (3.03%), AKF (acute kidney failure) (3.03%), Intra-uterine death (15.15%) and 18.18% women died. In eclamptic women, eight women developed pulmonary oedema, four had HELLP syndrome, intracranial bleed was diagnosed in one woman on computed tomography, five had intra-uterine death and four women died. Other obstetrical causes were twin pregnancy (10.66%), postpartum hemorrhage (8%), placental abruption (6.66%), hemoperitoneum (2.66%) and obstructed labour (2.66%).

The Non- Obstetrical causes of respiratory distress in the present study were Sepsis (40.42%), respiratory disease (23.40%), heart disease ((10.63%), Jaundice (14.89%), seizure disorder (4.25%), Dengue shock syndrome (4.25%) and Guillain Barre syndrome (2.12%). Severe anaemia in the index study were present in 10 women. Out of nineteen women with sepsis, five women were diagnosed to have septic shock, eleven women had puerperal sepsis, one woman had right lung collapse secondary to parotitis and two women had gastroenteritis. 13% of the women in the study had a preexisting respiratory condition which contributed to respiratory distress. Among women with-respiratory diseases (11), four women had pre-existing tuberculosis, three had bronchial asthma and one had pulmonary embolism. Three women presented with respiratory distress due to lung collapse secondary to cystic bronchiectasis and atelectasis of lung. Heart disease contributed as a cause of respiratory distress requiring ICU admissions in five women. The spectrum of heart disease in the present study included Eisenmenger syndrome (1), severe MR with TR (2), WPW syndrome (1) and severe pulmonary arterial hypertension secondary to severe ASD (1).

In the present study, the total maternal deaths were 37 in number; causes being attributed to severe pre-eclampsia(7), eclampsia(4), post partum hemorrhage (4), placental Abruption (1), heart disease (3), sepsis(9), respiratory disease (4), jaundice (1), Dengue shock syndrome (2), GBS (1), and twin with pulmonary oedema (1).

DISCUSSION

Acute respiratory distress syndrome is non-cardiogenic oedema caused by various mechanisms like increased capillary leak, increased blood volume, decreased albumin level or acute inflammatory response. ⁶ The majority of the women in the study were multiparous, from rural background and between the age of 21 and 30 years. Around two third women (64.75%) developed respiratory distress in the

antenatal period and one third (43.04%) in the postpartum period. The Caesarean rate among these women was significantly high at 60.75%. Heena Gupta et al conducted a study on critically ill obstetric women admitted to the ICU, and revealed that mean age of participants was 26 years, 84.25% belonged to a rural background and 84.2% of women had undergone caesarean section but most women were admitted to ICU during the postpartum period. ² Karanath et al studied pregnant women with respiratory complications and stated that for most women aged between 20-25 years, 51.4% were multigravida and 31.8% had Caesarean section. ⁵ The present study aligns with study by Heena Gupta et al and Karanath et al.

Hypertensive disorder of pregnancy

In index study, hypertensive disorders in pregnancy were found to be the most common cause of respiratory distress requiring ICU admissions and accounted for 32.43% death. The complications developed in these women were pulmonary oedema, HELLP, PPCM, thrombocytopenia, intracranial bleeding and acute kidney failure. 15 women underwent CS for maternal sake, 10 had IUD (intrauterine death) and 12 women died. Among 11 women who died due to pre-eclampsia, 2 exhibited thrombocytopenia, 4 had HELLP syndrome, 2 had pulmonary oedema in combination with severe anaemia, one with AKI, one atonic PPH in addition to severe anaemia and one with intracranial bleeding. Bhavanam N et al stated pre-eclampsia with severe features was the most predominant cause of ICU admission in pregnancy and accounted for 18.8% of deaths. ⁷ Tran PL et al studied 482 preeclampsia women, 19.5% needed ICU. The admissions were associated with HELLP syndrome, severe PPH, early onset pre-eclampsia, higher rate of C-section and poor fetal prognosis. ⁸ Camilla Edvinsson et al identified the reasons for ICU in pre-eclamptic women were dysregulated hypertension, HELLP syndrome, PPH, eclampsia, sepsis, kidney failure and pulmonary oedema. ⁹ The index study is similar to the above-mentioned study indicating pre-eclampsia and related disorders were the predominant common cause of maternal mortality and morbidity. Reasons for admission to the ICU were severe pre-eclampsia in combination with HELLP syndrome, postpartum haemorrhage, eclampsia, infection, kidney failure and pulmonary oedema/heart failure.

Sepsis

Nineteen (16.5 %) women were admitted with sepsis with respiratory distress, five women were diagnosed to have septic shock, eleven women had puerperal sepsis, one woman had right lung collapse secondary to parotitis and two women had gastroenteritis. 5 women died, 3 experienced preterm delivery and 2 had IUDs. Sepsis is a rare occurrence in pregnancy but is a prevalent reason for ICU admission in

pregnancy and postpartum. According to WHO, sepsis is one of the four main causes of maternal mortality.¹⁰ The incidence of sepsis resulting in maternal mortality varies from 2.1% to 11.1% as sepsis is associated with poor socioeconomic status of the country.^{10,11}

Respiratory Disease

11 antenatal women with respiratory disease with respiratory distress were admitted to the ICU. The predominant causes were tuberculosis, asthma, lung atelectasis, and cystic bronchiectasis. 3 women have died from asthma, emphysema and pulmonary hypertension. CY Hung identified bacterial pneumonia, influenza pneumonia (n = 2), and intraabdominal infections as the primary causes of respiratory distress during pregnancy.¹² Karanth S et al. reported that bronchial asthma, respiratory tract infections, allergic bronchitis, pulmonary oedema, pleural effusion, and tuberculosis frequently induced respiratory distress.⁵

Heart disease

5 women with respiratory distress had pre-existing heart disease admitted to ICU. Two women had severe MR with TR with PPCM, one with Eisenmenger syndrome, one woman with WPW syndrome and one with severe ASD with pulmonary hypertension. Among five, 3 women died due to Eisenmenger syndrome, severe ASD+PAH+Pulmonary TB, and severe MR with PPCM. The maternal death rate with significant pulmonary hypertension noted was 4.8% observed in the literature.^{13,14} The Eisenmenger syndrome carries a high mortality rate of 30-40% in pregnancy.¹⁵

Other Obstetrical causes

The other Obstetrical causes leading to respiratory distress were postpartum haemorrhage (6), hemoperitoneum (one due to splenic rupture and the other one with coagulation dysregulation), placental abruption (5) and twin pregnancy (8). Published literature on respiratory distress during pregnancy has been linked to placental abruption, pre-eclampsia, disseminated intravascular coagulation (DIC), and the use of tocolytics.¹⁶ Women experiencing postpartum haemorrhage developed pulmonary oedema and respiratory distress due to volume overload, transfusion-related acute lung injury, tocolytic agents, amniotic fluid embolism, the administration of drugs such as oxytocin, carboprost, and methylergometrine, as well as associated pre-eclampsia and cardiac disorders.^{17,18} Placental abruption is often associated with massive haemorrhage and extensive utilization of blood and blood products, resulting in respiratory distress.^{6,19} Multiple pregnancies are susceptible to pulmonary oedema due to an increase in blood volume of 400 ml compared to singleton pregnancies. The risk of volume overload and pulmonary oedema is highest at 32-35 weeks, during and after delivery,

with the use of tocolytics, and in the presence of concomitant conditions such as pre-eclampsia and severe anaemia.^{20,21}

In present study, 30.22% women died. The incidence of maternal mortality among obstetric women in ICU was determined to be 34.78% while in developed countries it ranges 15-20%.^{22,23}

CONCLUSION

Respiratory distress and ICU admission are one of the key indicators of maternal morbidity and mortality. To reduce maternal mortality, it is essential to identify the risk factors and causes of respiratory distress. Further strengthening the health care system from head to toe that is, starting from primary health units to tertiary health care services including ICU facilities and adopting a multidisciplinary strategy for all antenatal women from the preconception period to the postpartum period (42 days post-delivery) is crucial for the early identification and treatment of modifiable risk factors. The failure to identify several risk factors during early pregnancy accumulates in late pregnancy and results in pregnant women requiring intensive care unit.

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Conflicting interest

The Authors declare that there is no conflict of interest.

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