

A Prospective Study on Incidence, Causes and Outcome in Women Presenting with Dyspnea in Pregnancy

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Abstract

Background: Dyspnea is common during pregnancy. It can be due to the physiological adaptations taking place during pregnancy or due to the existing or newly developed cardiac or respiratory problem during gestation and puerperium. The cause of dyspnea in a gravid woman should be identified and treated accordingly in order to facilitate a favourable outcome for the mother and baby. **Objective:** To determine the incidence, etiology and fetomaternal outcome of women presenting with dyspnea in pregnancy and puerperium. **Methods:** This study was conducted in Department of Obstetrics and Gynaecology in Government General Hospital, Kadapa over a period of 6 months, where all women presenting with dyspnea in pregnancy and puerperium, admitted and treated in the Critical care obstetric unit of the department were selected for the study. A complete history and a thorough physical examination were done and the data were recorded and outcomes analysed. The primary outcome recorded was the incidence of dyspnea in pregnancy. The secondary outcomes analysed were the timing of presentation (either in first trimester or second trimester or third trimester or postpartum <48 hours, 3-7 days, >7 days); cause for dyspnea; any other obstetric complications; mode of delivery; need for ICU/HDU admission; duration and course in the hospital; mortality and cause of death in case of mortality and fetal outcome (fetus weight, need for NICU admission). Data was recorded on a proforma and analysed at the end of study. **Results:** The incidence of dyspnea was 2.6% among all obstetric admissions. Mean age was 25.1 years. 45% of cases presented in the antepartum period with 75% in the third trimester. 55% of cases presented postpartum with all women presenting within first 7 days. Grade 2 dyspnea was seen in majority (59%) followed by grade 3 (29%). Majority (70%) were stable at presentation but 22.5% were critical. 74% cases delivered, out of which 74% by caesarean section and 26% by vaginal delivery. Mean duration of hospital stay was 11.3 days. Severe anemia (27%) was the most common cause followed by severe preeclampsia (22.5%) and CoVID 19 (20%). 5% of women admitted succumbed to pulmonary edema and ARDS. 20% babies needed NICU admission with a mortality rate of 1.3%. **Conclusion:** Dyspnea in a pregnant woman should not be regarded as physiological always. The cause of dyspnea should be identified and treated accordingly in order to facilitate a favourable outcome for the mother and baby as easily treatable and preventable causes account for most of the cases.

Keywords: Dyspnea, Causes, Fetomaternal outcome, Pregnancy.

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Introduction

Dyspnea or shortness of breath may be a common symptom in pregnancy presenting in 60-70% of normal women[1]. It starts early in the pregnancy, improves as gestation progresses and plateaus near term. Most women usually tolerate it as it does not interfere with day to day activities. The dyspnea is considered physiologic if it does not affect normal activity and appears to remain stable early on and improves at term and lacking symptoms of cardiorespiratory disease.²The exact cause for this dyspnea is debatable and has been attributed to physiological changes in pregnancy, mechanical and hormonal factors. The important physiological changes in the respiratory system contributing to dyspnea are a change in perception of normal respiration, hyperventilation in response to the decreased diffusion lung capacity, increased sensitivity of the central chemoreceptors to carbon dioxide[3]. Mother has to compensate for the increased peripheral oxygen consumption by the fetus by increasing the

respiratory rate. Similarly in the cardiovascular system, changes like increase in blood volume, decrease in peripheral vascular resistance during early pregnancy and increase in heart rate lead to increased cardiac and metabolic workload[4].

The main mechanical factors responsible for dyspnea are mechanical compression of the lungs due to increased intra-abdominal volume and upward displacement of the diaphragm by the gravid uterus. The role of mechanical factors is controversial as dyspnea is also present in the early weeks of pregnancy with a smaller uterus and fetus[3,4]. Among the hormonal factors, progesterone plays the major role. Progesterone is a respiratory stimulant. Its effect starts as early as 4 weeks of pregnancy and continues to be present through second and third trimesters. Human chorionic gonadotropin (HCG) plays an important role in the first trimester and acts by exerting a thyroid stimulating activity. This action of HCG can cause exacerbations in asthmatic women. Cortisol and estrogens also play a minor role. Prostaglandin F class, thromboxane A2 and histamine are all potent bronchoconstrictors. Their levels are increased in all trimesters[5].

The most common condition causing dyspnea in pregnancy is anemia. According to NFHS 4 (2015-2016) survey, prevalence of anemia in women aged 15-49 years in India and Andhra Pradesh are 53% and 60% respectively. Among pregnant women, the prevalence was 50.4% with 1.3% being severely anemic (Hb< 7g/dl)[6]. While mild to moderate anemia does not have serious impact on mother and

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fetus, severe anemia may have adverse effects like prematurity, spontaneous abortions, low birth weight and maternal and fetal mortality. Anemia with Hb < 6 g/dl is associated with poor pregnancy outcome[7]. Asthma is another important cause for dyspnea with a prevalence rate of 4-8 % in pregnant women. One-third of the women with asthma improve with gestation, another third remain stable, while the other third can worsen. 20% of women experience intrapartum exacerbations and the severity of exacerbations correlated with the baseline severity of asthma[8]. Caesarean section carries 18 fold greater risk of exacerbation than vaginal delivery. Pregnancy outcome is usually excellent with mild to moderate disease and well controlled asthma. Increased incidence of preterm delivery and pregnancy induced hypertension are seen in women with severe asthma whereas low birth weight and intrauterine growth restriction are the fetal effects seen[9]. Alterations in the cell mediated immunity during pregnancy to protect the fetus from being rejected as a foreign body can predispose the women to develop infections. Pneumonia accounts for 4.2 % of all antepartum admissions for non-obstetrical complications. It is also a frequent cause for readmission in postpartum period. Viruses cause half of all pneumonias in pregnant women. Risk factors associated are smoking, chronic bronchitis, asthma, HIV and aspiration pneumonitis. Morbidity and mortality have reduced dramatically with the advent of newer and better antibiotics. Foetal loss, preterm delivery,

premature rupture of membranes and low birth weight are the complications of pneumonia in pregnancy[10,11]. In this present pandemic situation, CoVID 19 infection continues to pose a threat to general population and pregnant women. Of all the patients, 85% of women have mild disease, 10% more severe disease and 5% critical disease. The most common symptoms of CoVID 19 are fever, cough, dyspnea and diarrhoea. Dyspnea is present in 7-18% of cases. Either caesarean or vaginal delivery does not have additional risks and there is very minimal risk of vertical transmission to the neonate from either mode of delivery[12]. At present, there is no evidence that CoVID 19 has teratogenic effects and virus has not been identified in amniotic fluid, placenta and breast milk. Early studies report no increased rates of miscarriage or early pregnancy loss. Maternal mortality is very low (<1%) compared to SARS-CoV (25.8%) and MERS-CoV (28.6%)[13].

Acute pulmonary edema is an important cause of dyspnea in pregnancy. The incidence of acute pulmonary edema in tertiary care centres is 1 in 500. 47% cases present in the antenatal period, 14% present intrapartum and 39% present in the postnatal period[14]. The mean gestational age at the time of diagnosis is between 26 and 32 weeks. Postpartum cases usually occur within 7 days after delivery. Non-cardiogenic causes are more common than cardiogenic causes. The common predisposing conditions to acute pulmonary edema are shown in Table 1.

Table 1: Predisposing Conditions for Acute Pulmonary EDEMA in Pregnancy

Non-Cardiogenic Causes	
1.	Pre eclampsia syndrome
2.	Severe sepsis
3.	Tocolytic therapy – beta mimetics, magnesium sulphate
4.	Aggressive intravenous fluid therapy
5.	Aspiration pneumonitis
6.	Pancreatitis
Cardiogenic Causes	
1.	Structural heart disease
2.	Cardiomyopathy
3.	Aggressive intravenous fluid therapy
4.	Obesity
5.	Pulmonary hypertension

The most common presentation of amniotic fluid embolism (AFE) is dyspnea. This condition has high mortality rate and is chiefly due to the disruption in the uteroplacental bed. The incidence of AFE is 1-12/100,000 deliveries[15]. Predisposing conditions include precipitant labour, meconium-stained liquor, post-term pregnancy, eclampsia, caesarean section and abruption placenta. 70% of the cases occur during labour (usually minutes before delivery), 19% occur during caesarean section and 11% occur during vaginal delivery. Those who survive may develop permanent neurological sequelae. Foetal outcome is better compared to maternal outcome[11]. Pulmonary embolism (PE) is a relatively uncommon condition in pregnancy occurring in 1 in 7000 deliveries. PE is the leading cause of maternal death in the developing countries. Risk factors include heart disease, age >35 years, caesarean section, sickle cell anemia, diabetes, smoking, multiple pregnancy, obesity, oral contraceptives, hormonal replacement therapy and family history of PE[16].

Peripartum cardiomyopathy (PPCM) is a potentially life-threatening condition typically presenting as heart failure with reduced ejection fraction in the last month of pregnancy or in the months following delivery in women without another known cause of heart failure. Incidence may be as high as 1 in 1000 live births in the Asian population. Most women present in the first week after delivery while some may present in 2nd and 3rd trimesters with symptoms and

signs of heart failure[17]. Predisposing factors for PPCM are multiparity, increasing maternal age, multiple gestation, positive family history, smoking, diabetes, hypertension, anemia, obesity, pre-eclampsia, malnutrition and prolonged use of beta mimetics. Several factors have been attributed to etiopathogenesis and they include genetic predisposition, low selenium levels, viral myocarditis, stress-activated cytokines, autoimmune process, pathological response to haemodynamic stress, unbalanced oxidative stress and induction of anti-angiogenic factors. Recovery frequently occurs in 3 to 6 months but around 35% remain to have persistent cardiomyopathy. Mortality ranges from 4%-25% depending on race, geography and follow up duration[18]. Acute respiratory distress syndrome (ARDS) is a medical emergency complicating pregnancy. The incidence of ARDS in the pregnancy is low (0.2%–0.3%) but the mortality ranges between 30% and 60% depending on need of mechanical ventilation[19]. If ARDS develops antenatally, the mortality rate is correspondingly high. The causes of ARDS in pregnancy are listed in the table 2. As acute foetal hypoxia occurs in ARDS, higher rates of neonatal mortality, preterm delivery and foetal heart rate abnormalities are seen.

Table 2: Causes of ARDS in Pregnancy

Obstetric	Non-Obstetric
1. Eclampsia	1. Sepsis
2. Chorioamnionitis	2. Pneumonia
3. Amniotic fluid embolism	3. Transfusion Related Acute Lung Injury (TRALI)
4. Abruptio placenta	4. Aspiration of gastric contents
5. Obstetric hemorrhage	5. Disseminated intravascular coagulation (DIC)
6. Acute fatty liver of pregnancy	6. Trauma
7. Retained placental products	
8. Septic abortion	

Methodology

This study was conducted in Department of Obstetrics and Gynaecology in Government General Hospital, Kadapa over a period of 6 months, where all women presenting with dyspnea in pregnancy and puerperium, admitted and treated in the Critical care obstetric unit of the department were selected for the study. Dyspnea was graded according to New York Heart Association classification from grade I – IV. A complete history was taken and a thorough physical examination was done. All the appropriate investigations (CBC, LFT, RFT, ECG, Chest X ray, 2D Echo, CoVID PCR) were done and the data were recorded and outcomes analysed. The primary outcome recorded was the incidence of dyspnea in pregnancy. The secondary outcomes analysed were the timing of presentation (either in first trimester or second trimester or third trimester or postpartum

<48 hours, 3-7 days, >7 days); cause for dyspnea; any other obstetric complications; mode of delivery; need for ICU/HDU admission; duration and course in the hospital; mortality and cause of death in case of mortality and fetal outcome (fetus weight, need for NICU admission). Data was recorded on a proforma and analysed at the end of study.

Results

Out of the 3903 obstetric admissions, 102 women were admitted with dyspnea. The incidence of dyspnea in our study was 2.6%. The mean age of pregnant women admitted with dyspnea was 25.1 years. Multiparous women (n=60, 59%) were more common than primigravida women (n=42, 41%). 45% of cases (n=46) presented in the antepartum period. Out of which, 4%, 17% and 79% cases presented in the first, second and third trimester respectively.

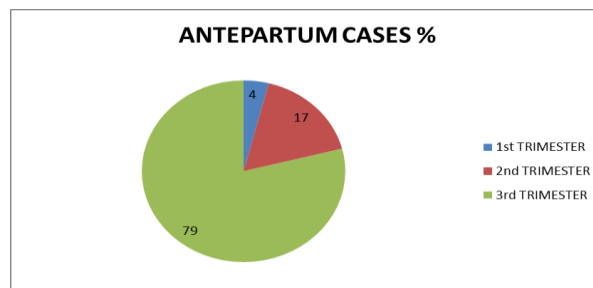


Fig 1:Antepartum of cases

Remaining 55% of cases (n=56) presented in the postpartum period. 57% cases (n=32) presented in the first 48 hours postpartum and 43% cases (n=24) presented between 2 to 7 days. None of the cases presented after 7 days of postpartum period.

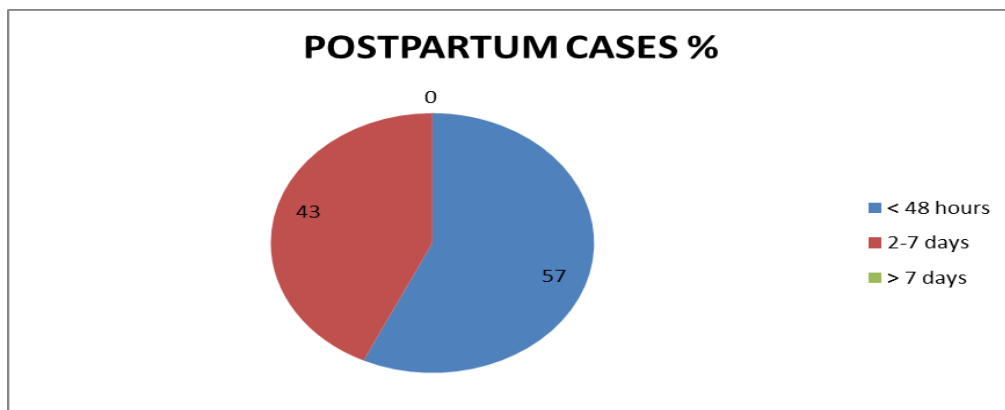


Fig 2:Postpartum cases

Grade 2 dyspnea was seen in majority (n=60, 59%) of the women followed by grade 3 (n=30, 29%), grade 4 (n=7, 7%) and grade 1 (n=5, 5%).

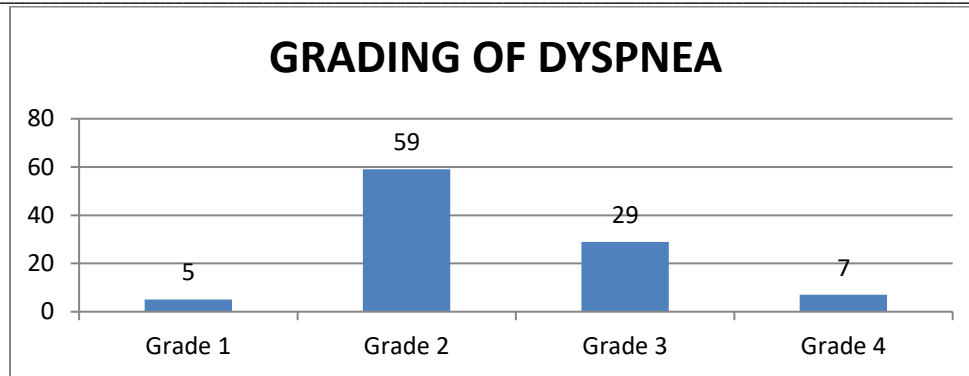


Fig 3: Grading of Dyspnea

Majority (n=71, 70%) of the cases were stable at admission but 22.5% (n=23) were critical needing ICU admission and respiratory support. 7.5% cases (n=8) were sick but not critical. 74% (n=75) of the cases delivered and 22.5% (n=23) did not deliver. 4 cases underwent D&C for abortion. Out of 102 cases taken in our study, 75

women delivered. Of those delivered, 55 cases (74%) delivered by caesarean section and 20 cases (26%) by vaginal delivery. Mean duration of stay in the hospital was 11.3 days. Severe anemia (27%) was the most common cause followed by severe preeclampsia (22.5%) and CoVID 19 (20%).

Table 3: Causes of Dyspnea

Cause of Dyspnea	N	%
Severe anemia	30	27
Severe preeclampsia	25	22.5
CoVID 19	22	20
Asthma	8	7
Peripartum cardiomyopathy	5	4.5
Pneumonia	4	4
Unknown	3	2.7
Dyselectrolytemia	3	2.7
Rheumatic heart disease	2	1.8
Blood transfusion reaction	2	1.8
Congenital heart disease	1	1
Paroxysmal supraventricular tachycardia	1	1
Schizophrenia	1	1
Molar pregnancy	1	1
B/L Pleural effusion	1	1
Hyperthyroidism	1	1
Allergic to pantoprazole	1	1

5% (n=5) of women enrolled in this study succumbed. The cause of death in all 5 cases was due to pulmonary edema and acute respiratory distress syndrome. The mean gestational age of the babies born in this study was 36.4 weeks. The mean gestational age among babies who survived and died were 37 weeks and 32.8 weeks respectively. Out of the 75 babies born to these mothers, 15 babies (20%) were admitted to NICU. A total of 10 babies died in our study and mortality rate was 13%. The most common cause of fetal death was prematurity (n=5, 50%) followed by stillborn (n=2, 20%), neonatal sepsis (n=2, 20%) and severe IUGR (n=1, 10%).

Discussion

Dyspnea or shortness is a common phenomenon occurring in pregnancy. The incidence of dyspnea in our study is 2.6% which is supported by a similar study done by Marwah S et al[21] Younger women were affected with a mean age of 25.1 years as women in our country are married young and start childbearing from a young age. Ansari A et al²² in their study also reported a similar finding. Multiparous women were more compared to primigravida as reported by previous studies.²¹⁻²³ Most of the cases presented in antepartum period with maximum reported in the third trimester as the mechanical and physiological factors add to the existing discomfort.

Similar finding was seen in studies by Marwah et al and Ansari et al. Grade 2 and grade 3 dyspnea were found in most of the cases with increasing severity of disease present with greater grades of dyspnea. This finding was supported in similar studies. 73% of cases delivered in our study. Catanzarite[24], in his study found out a similar proportion of undelivered cases. Majority of the cases were stable at the time of admission but a fraction of cases were critical as mentioned by Lee S et al in their study[23].

The most common of dyspnea in our study was severe anemia presenting with congestive cardiac failure in contrast to study by Marwah S et al and Ruys TP et al[25] which showed preeclampsia and cardiac conditions as the major causes. 20% of the cases were due to CoVID 19 infection, all presenting with dyspnea. This finding was also reported by Ryan GA et al[26] in their study. Mortality rate in our study was 5% which is supported by all the previous study done but the study by Marwah et al reported a high mortality rate of 28.5% due to late referral and presentation. Majority of the babies born were preterm and the chief reason for NICU admission was also for preterm care. All the previous studies were noted to have the same finding. Very few studies have reported neonatal mortality rate but in our study, we report a mortality rate of 13% for the babies

admitted to NICU and prematurity and its complications being the main cause for death among neonates.

The main drawbacks of our study were a smaller number of cases recorded and limited study period. The study should be extended to a longer duration and larger population of cases to come to accurate and reliable conclusion.

Conclusion

Dyspnea in a pregnant woman should not be regarded as physiological always. The cause of dyspnea should be identified and treated accordingly in order to facilitate a favourable outcome for the mother and baby as easily treatable and preventable causes account for most of the cases. Proper counselling in the antenatal period and quality antenatal care can help the patient and obstetrician for a smooth and pleasant delivery and childbirth.

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