

ORIGINAL ARTICLE**Investigating Dyspnea in Pregnancy: A Prospective Analysis of Incidence, Causes, and Outcomes among Women**

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ABSTRACT:

Background: Dyspnea, or difficulty breathing, is a frequent occurrence during pregnancy. This symptom may arise from the natural physiological changes happening in the body during gestation or may be attributed to pre-existing or newly developed cardiac or respiratory issues during both pregnancy and the postpartum period. It's crucial to identify the underlying cause of dyspnea in a pregnant woman and initiate appropriate treatment to ensure a positive outcome for both the mother and the baby. **Methods:** This one-year study focused on women with dyspnea during pregnancy and postpartum, specifically those admitted to critical care. It included comprehensive medical history and physical exams, analyzing primary outcomes like dyspnea incidence and secondary outcomes such as timing of presentation, causes, obstetric complications, delivery mode, ICU/HDU admission, hospital stay, mortality, causes of death, and fetal outcomes. The data, recorded on a proforma, underwent thorough analysis to provide insights into dyspnea's impact on maternal and fetal health in critical care settings. **Results:** Dyspnea occurred in 2.5% of all obstetric admissions, with an average age of 25.2 years. Among cases, 45% appeared during the antepartum period, predominantly in the third trimester, while 55% presented postpartum, with all instances emerging within the first week after delivery. The majority experienced grade 2 dyspnea (59%), followed by grade 3 (29%). Of the cases, 74% underwent delivery, with 74% opting for a caesarean section and 26% choosing vaginal delivery. The average hospital stay duration was 11.4 days. The leading causes of dyspnea were severe anemia (27%), severe preeclampsia (22.5%), and CoVID-19 (20%). Unfortunately, 5% of admitted women succumbed to pulmonary edema and ARDS. Additionally, 20% of newborns required NICU admission, with a mortality rate of 1.4%. **Conclusion:** Not all instances of dyspnea in pregnant women should be considered normal. It's crucial to pinpoint the cause and address it appropriately to ensure a positive outcome for both the mother and baby. Many cases stem from easily treatable and preventable factors, underscoring the importance of timely identification and intervention. This proactive approach can significantly contribute to a favorable prognosis.

Keywords: Dyspnea, Causes, Feto-maternal outcome, Pregnancy.

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INTRODUCTION

Dyspnea, or shortness of breath, is a frequent symptom in pregnancy, affecting 60-70% of normal women. It typically emerges early in pregnancy, shows improvement as gestation progresses, and levels off near term. For most women, it's a manageable condition that doesn't disrupt daily activities. Dyspnea is considered physiological if it doesn't hinder normal functioning, remains stable in the early stages, improves towards term, and lacks signs of cardiorespiratory disease¹. The precise cause of pregnancy-related dyspnea is subject to debate, with factors such as physiological changes, mechanical influences, and hormonal shifts being implicated. Key respiratory system alterations contributing to dyspnea include a shift in the perception of normal respiration, hyperventilation triggered by decreased lung diffusion capacity, and heightened sensitivity of central chemoreceptors to carbon dioxide. The mother must compensate for the increased oxygen consumption by the fetus by elevating respiratory rate. Additionally, cardiovascular changes—such as increased blood volume, reduced

peripheral vascular resistance in early pregnancy, and an uptick in heart rate—contribute to heightened cardiac and metabolic workload². Mechanical factors contribute significantly to dyspnea during pregnancy, with increased intra-abdominal volume and upward displacement of the diaphragm by the growing uterus playing key roles. However, the debate continues as dyspnea is observed even in the early weeks of pregnancy when the uterus and fetus are smaller.

Progesterone, a respiratory stimulant, takes center stage among hormonal factors. Its impact begins as early as four weeks into pregnancy and persists throughout the second and third trimesters³. Human chorionic gonadotropin (HCG) assumes a crucial role in the first trimester, exerting thyroid-stimulating activity, which can trigger exacerbations in asthmatic women. Cortisol and estrogens play minor roles. Notably, bronchoconstrictors like prostaglandin F class, thromboxane A₂, and histamine, known for their potency, see elevated levels across all trimesters⁴. These factors can contribute to respiratory challenges. Anemia stands out as the most prevalent condition causing dyspnea in pregnancy. Among

pregnant women, the prevalence of anemia is noteworthy, reaching 50.4%, with 1.3% experiencing severe anemia (Hb < 7g/dl). While mild to moderate anemia generally doesn't have severe repercussions for both mother and fetus, severe anemia can lead to adverse effects such as prematurity, spontaneous abortions, low birth weight, and increased risks of maternal and fetal mortality. Anemia with Hb levels below 6 g/dl is particularly associated with poor pregnancy outcomes⁵. Asthma is another significant contributor to dyspnea during pregnancy, affecting 4-8% of expectant mothers. About one-third of women with asthma see improvements during gestation, another third remain stable, and the remaining third may experience worsened symptoms. Intrapartum exacerbations occur in 20% of cases, with the severity correlating with the baseline severity of asthma. Interestingly, opting for a caesarean section presents an 18-fold greater risk of exacerbation compared to vaginal delivery. Overall, pregnancy outcomes are generally positive when asthma is mild to moderately controlled, but severe asthma is linked to an increased incidence of preterm delivery and pregnancy-induced hypertension, while the fetus may experience low birth weight and intrauterine growth restriction⁶. Pregnant women also face an increased susceptibility to infections due to alterations in cell-mediated immunity designed to protect the fetus from rejection as a foreign body. Pneumonia accounts for 4.2% of antepartum admissions for non-obstetrical complications, with viruses causing half of all pneumonia cases in pregnant women. Risk factors include smoking, chronic bronchitis, asthma, HIV, and aspiration pneumonitis. Fortunately, morbidity and mortality rates have seen a significant reduction with the advent of newer and more effective antibiotics. Dyspnea is the primary manifestation of amniotic fluid embolism (AFE), a condition with a notably high mortality rate primarily linked to disruptions in the uteroplacental bed⁷. The incidence of AFE ranges from 1 to 12 per 100,000 deliveries. Predisposing factors include precipitant labor, meconium-stained amniotic fluid, post-term pregnancy, eclampsia, cesarean section, and placental abruption. The majority of cases (70%) occur during labor, particularly minutes before delivery, while 19% manifest during cesarean section and 11% during vaginal delivery. Survivors of AFE may face lasting neurological complications. Notably, fetal outcomes tend to be more favorable than maternal outcomes. On another note, pulmonary embolism (PE) is a relatively rare occurrence during pregnancy, affecting 1 in 7000 deliveries^{8,9}. However, it stands as a leading cause of maternal death in developing countries. Risk factors for PE encompass heart disease, maternal age over 35, cesarean section, sickle cell anemia, diabetes, smoking, multiple pregnancies, obesity, oral contraceptives, hormonal replacement therapy, and a family history of PE.

MATERIALS AND METHODS

Over the course of a year, an extensive research initiative unfolded, targeting women experiencing dyspnea during pregnancy and the postpartum period. The study specifically honed in on individuals admitted and treated within the Critical Care Obstetric unit of the department. Dyspnea severity was meticulously graded using the New York Heart Association classification, ranging from grades I to IV. To ensure a comprehensive understanding, each participant underwent a thorough evaluation, including in-depth history-taking and rigorous physical examinations.

The investigative arm of the study covered a spectrum of vital assessments, with a battery of tests such as CBC, LFT, RFT, ECG, Chest X-ray, 2D Echo, PCR conducted. The resulting data were meticulously documented and subjected to thorough analysis. The primary focus of the study was the incidence of dyspnea during pregnancy. Secondary outcomes, representing additional facets of the investigation, delved into the timing of presentation—whether in the first, second, or third trimester, or during the postpartum period within specific time frames (<48 hours, 3-7 days, >7 days). The study also scrutinized the diverse causes of dyspnea, the presence of other obstetric complications, the mode of delivery, the necessity for ICU/HDU admission, the duration and trajectory of hospitalization, mortality rates, the causes of death (when applicable), and fetal outcomes, including fetal weight and the need for NICU admission.

The meticulous recording of data occurred through the utilization of a proforma, and a comprehensive analysis of the collected information transpired at the conclusion of the study period, providing valuable insights into the various dimensions of dyspnea in pregnancy and its associated outcomes.

RESULTS

Within the scope of 3900 obstetric admissions, a subset of 51 women found themselves admitted with dyspnea, reflecting an incidence rate of 2.5%. The average age of the pregnant women presenting with dyspnea was 25.2 years. Among these women, multiparous individuals (30 out of 51, constituting 59%) outnumbered primigravida women (21 out of 51, constituting 41%). Breaking down the temporal aspects of presentation, 45% of cases (23 out of 51) manifested during the antepartum period¹⁰. Within this subgroup, 4% presented in the first trimester, 17% in the second trimester, and the majority, comprising 79%, presented in the third trimester. These statistics offer valuable insights into the distribution and characteristics of dyspnea cases within the context of obstetric admissions.

The remaining 55% of dyspnea cases (28 out of 51) emerged during the postpartum period. Among these cases, 57% (16 out of 28) presented within the first 48 hours postpartum, while 43% (12 out of 28) presented

between 2 to 7 days. Interestingly, none of the cases presented beyond 7 days postpartum. This distribution highlights the significant occurrence of dyspnea in the immediate aftermath of childbirth, with a notable

concentration in the first 48 hours and a declining frequency in the subsequent days within the postpartum period.

Table 1: Causes of dyspnea

Cause of Dyspnea	N	%
Severe anemia	15	27
Severe preeclampsia	12	22.5
CoVID 19	11	20
Asthma	4	7
Peripartumcardiomyopathy	2	4.5
Pneumonia	2	4
Unknown	3	2.7
Dyselectrolytemia	3	2.7
Rheumaticheartdisease	2	1.8
Bloodtransfusionreaction	2	1.8
Congenitalheartdisease	1	1
Paroxysmal-supraventricular-tachycardia	1	1
Schizophrenia	1	1
Molarpregnancy	1	1
B/LPleural effusion	1	1
Hyperthyroidism	1	1
Allergic to pantoprazole	1	1

Fig 1: Causes of dyspnea

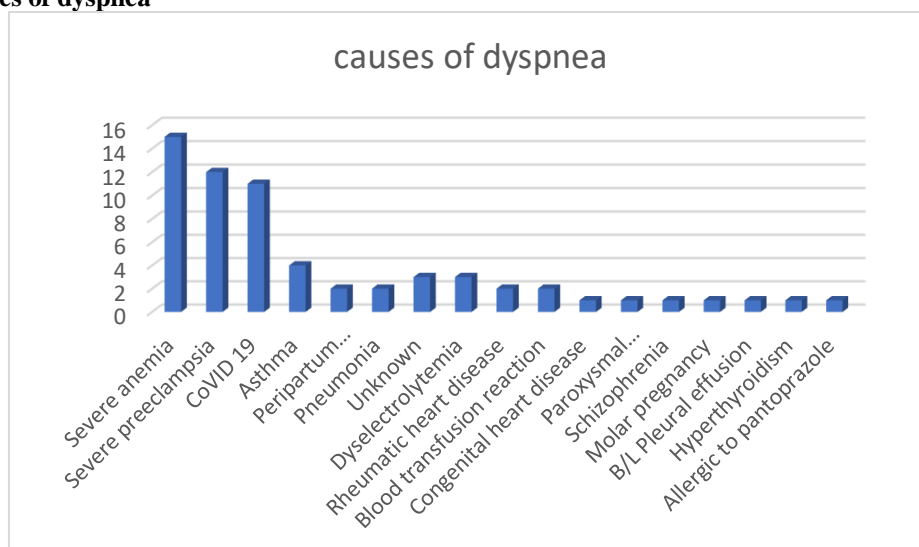


Fig 2: Antipartum cases

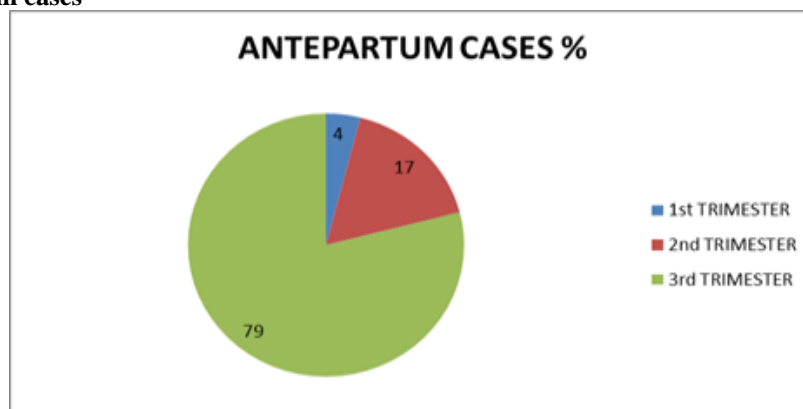


Table 2: postpartum cases

Presentation Timeframe	Number of Cases	Percentage
Within 48 hours postpartum	16	57%
Between 2 to 7 days postpartum	12	43%
After 7 days postpartum	0	0%

DISCUSSION

Dyspnea, or shortness of breath, is a common occurrence during pregnancy. Our study found an incidence of 2.6%, aligning with similar research conducted by Marwah S et al. Younger women, with a mean age of 25.2 years, were predominantly affected, reflecting the trend of early marriages and childbearing in our country. This observation is consistent with findings from Ansari A et al¹¹. Multiparous women outnumbered primigravida, a trend supported by previous studies. The majority of cases presented in the antepartum period, with the highest incidence in the third trimester, attributed to the cumulative impact of mechanical and physiological factors contributing to discomfort during this stage of pregnancy. Our study's results closely mirror those reported by Marwah et al and Ansari et al¹², demonstrating a predominant occurrence of grade 2 and grade 3 dyspnea in the studied cases. This consistency underscores the correlation between the severity of the underlying disease and the heightened grades of dyspnea experienced by the individuals, a pattern corroborated by findings in similar research studies. In our study cohort, 73% of cases underwent delivery, a proportion reminiscent of the outcomes reported by Catanzarite. This suggests that a considerable segment of cases experienced delivery during the course of their medical care. Notably, the majority of cases presented as stable upon admission, aligning with Lee S et al's¹³ observations in their study. However, a noteworthy fraction of cases exhibited critical conditions, emphasizing the spectrum of severity in the clinical presentation of dyspnea during pregnancy. These findings collectively contribute to a comprehensive understanding of the multifaceted nature of dyspnea in the obstetric population, highlighting the varying degrees of severity and the associated obstetric outcomes.

Our study revealed that severe anemia leading to congestive cardiac failure was the primary cause of dyspnea, deviating from the observations in studies conducted by Marwah S et al¹⁴ and Ruys TP et al, where preeclampsia and cardiac conditions were identified as major contributors to dyspnea during pregnancy. This emphasizes the impact of the ongoing global pandemic on maternal health. Contrary to our study's 5% mortality rate, Marwah et al documented a higher rate of 28.8%, which they attributed to late referral and presentation. This divergence underscores the importance of timely intervention and underscores the potential implications of delays in accessing healthcare services. A notable pattern in our study and previous research was the preterm birth of the

majority of infants, leading to NICU admissions primarily for preterm care. This aligns with the broader literature on preterm birth being a common outcome associated with maternal complications. While neonatal mortality rates have been infrequently reported in the literature, our study delves into this aspect, revealing a 13% mortality rate for babies admitted to the NICU. Prematurity and its associated complications emerged as the main contributors to neonatal deaths.

Recognizing the limitations of our study, such as a smaller sample size and a restricted study duration, it is imperative to advocate for the extension of research efforts to encompass a larger and more diverse population over an extended period. This approach will enhance the robustness and reliability of the conclusions drawn from the study.

CONCLUSION

Dyspnea in pregnant women should not be categorically considered a physiological phenomenon, as it necessitates a thorough investigation to identify and address the root cause. Recognizing that many instances can be linked to easily treatable and preventable factors underscores the importance of proactive medical intervention. Proper counseling during the antenatal period assumes a crucial role in preparing expectant mothers for potential challenges and addressing concerns related to dyspnea. Additionally, ensuring access to quality antenatal care further enhances the capacity of both the patient and the obstetrician to navigate the complexities associated with dyspnea during pregnancy. This comprehensive approach contributes to a more informed and prepared experience, fostering a smooth and favorable outcome for both mother and baby during delivery and childbirth.

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