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Assessment of Clinical and Echocardiographic findings of Pregnant Women with Dyspnea

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ABSTRACT

Background: It has frequently been observed that dyspnea when pregnant is caused by a rise in minute breathing. Many factors, including anemia, the weight of the developing uterus, an increase in pulmonary blood supply, as well as congestion in the nose, can cause dyspnea during pregnancy.

Objective: Objective of the present study was to assess the prevalence and clinical and echocardiographic findings of pregnant women with dyspnea.

Methodology: The current analytical cross-sectional study was conducted at the gynecology and obstetrics department of a tertiary care hospital from January 2022 to June 2022 after the approval from ethical review board of the hospital. Informed consent was obtained from all the participants and then the dyspnea was assessed properly for all of them, through a properly adopted questionnaire before, moreover, echocardiography (ECHO) was done for those who had a breathing problem.

Results: A total of 280 pregnant females were included in the current study having a mean age of 29.24 ± 4.17 years with a standard deviation of. The over prevalence of dyspnea was 27.5% of which 3 (3.89%) of them were from the first trimester, 23 (29.87%) second trimester and 51 (66.23%) had 3rd trimester with a p-value of 0.001, showing a significant association between dyspnea and the trimesters. Cardiac conditions were more common at 49 (63.63%), followed by hypertension at 19 (24.67%).

Conclusion: the current finds that sPAP, left ventricular end-systolic diameter (LVESd), along LVEDd were found to be out of the range considered normal in the current investigation. Additionally, most dyspneic women have cardiac conditions. Therefore, dyspneic women need to have a cardiovascular assessment by doing EECHO, to properly roll out the role of cardiac disease in the development of dyspnea.

Keywords: Dyspnea; Pregnant Women; Left Ventricular End-Diastolic Pressure; Pulmonary Hypertension

Introduction

It has frequently been observed that dyspnea when pregnant is caused by a rise in minute breathing. Many factors, including anemia, the weight of the developing uterus, an increase in pulmonary blood supply, as well as congestion in the nose, can cause dyspnea during pregnancy. About 75% of pregnant women experience exertion-related dyspnea throughout the initial thirty weeks of their pregnancy.[1-4] Pregnancy dyspnea is a frequent disease that makes relatively everyday chores difficult. It is also often known as shortness of breath (SOB), and uncomfortable breathing. Regardless of whether they have never had cardiac or pulmonary illness before, around 50% of all women who are pregnant will suffer from it at some stage during their period of pregnancy.[5] Nevertheless, dyspnea might happen to some women for no apparent reason. The sheer amount of burden associated with pregnancy modifies the cardiopulmonary system in specific ways. discovered that when trimesters progress, the volume of stroke, cardiac function, and cardiac ejection fraction all increase while the resistance of peripheral arteries decreases during pregnancy.[6] Breathing difficulties while pregnant may cause a de-compensation. Obstetricians face a particular clinical difficulty when evaluating and treating a sick obstetric patient experiencing respiratory compromise. This is mostly caused by changes in physiology in the mother, and several pregnancy-specific illnesses that need intensive medical management, including the presence of a developing baby whose health is dependent on the woman who is pregnant.[7] In the United States, an estimated 6.6 million women suffer from cardiovascular conditions (CVDs), which are the leading cause of death and disability in this population.[8] Numerous pregnant women with cardiac issues have had successful monitoring and medical care thanks to advancements in obstetrics along with cardiology. Major changes in perceptions of expectant mothers with cardiac issues have been noted recently. It was once thought that women suffering from cardiovascular conditions shouldn't get pregnant, back at the turn of the century. Nonetheless, it is now recognized that with careful supervision, women with heart conditions can continue their pregnancies thanks to medical advancements.[9] The pregnant woman's normal body function is significantly altered by the numerous aberrations that come with pregnancy. The respiratory system is impacted by modifications in the body's anatomy and physiology during pregnancy.[10] A rise in the second venous circulation causes an increase in volume in pregnancy when there is a rise in the output of the heart. However, some writers contend that peripheral blood vessel dilation triggers the renin-angiotensin-aldosterone (RAS) pathway, which causes a volume rise.[11] Consequently, if they receive the right care, women with significant heart defects can conceive. Increased pulmonary vascular resistance is a hallmark of pulmonary hypertension (PH), a serious progressive illness that may ultimately result in right heart failure and death. Information gathered from national and international registry organizations shows that the number of cases with PH is rising globally. A rise in pulmonary artery pressure (PAP) is linked to PH and can be caused by many cardio-pulmonary conditions. In non-invasive assessments, a mean PAP of 14±3 mmHg at rest is regarded as normal. Nonetheless, PH is determined if mPAP is ±25 mmHg.[12]

The study we conducted aimed to identify the fundamental cause of dyspnea. When considering the fetal prognosis as well as maternal risk, a strategy of prompt delivery through the pregnancy is frequently warranted in such women, allowing for an accurate diagnosis between serious dyspnea versus dyspnea during a typical pregnancy. These would therefore help create organizational recommendations for treating these women who have dyspnea, which might be advantageous for all women who are pregnant.

Objective

Assess the prevalence and clinical and echocardiographic findings of pregnant women with dyspnea.

Methodology

The current analytical cross-sectional study was conducted at the gynecology and obstetrics department of a tertiary care hospital from January 2022 to June 2022 after the approval from ethical review board of the hospital. A total of 280 pregnant females were included in the study, irrespective of their duration of being pregnant. However, those having prior cardiac disease, anemia, respiratory diseases, and other chronic diseases were excluded from the study. Informed consent was obtained from all the participants and then the dyspnea was assessed properly for all of them, through a properly adopted questionnaire before, moreover, echocardiography (ECHO) was done for those who had a breathing problem, to identify the cause. Hemoglobin (HB), glucose, alanine transaminase (ALT), and aspartate transaminase (AST) were all recorded. Echocardiography was used to measure the left ventricle end-diastolic diameter (LVEDd), left ventricular ejection fraction (LVEF%), systolic pulmonary artery pressure (sPAP), and left ventricle end-systolic diameter (LVESd). All the collected was analyzed by SPSS 23 version accordingly.

Results

A total of 280 pregnant females were included in the current study having a mean age of 29.24 years with a standard deviation of ±4.17.

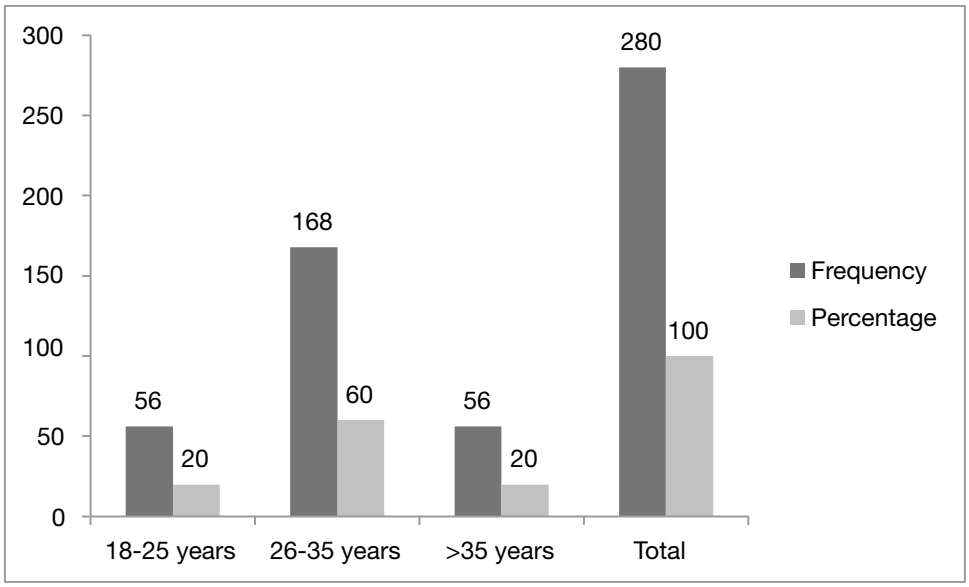

Figure 1. Age wise distribution of patients

Figure 1. Distribution of study cases on the basis of age group, Based on age wise distribution, 56 (20%) female were in age group 18-25 years, 168 (60%) female were in age group 26-35 years while 56 (20%) female were in age group >35 years.

Moreover, 79 (28.21 %) of them have the first semester, and 93 (33.21 %) of the selected women belong to the second trimester, in addition, 38.58 % (108) of them have the third trimester.

Among study cases, 77 (27.5%) experienced dyspnea. These were from different age group, of which 15 (19.48%) fromage group 18-25 years, 43 (55.84%) from age group 26-35 years, 19 (24.68%) fromage group >35 years. Figure 2 represents the prevalence of dyspnea per trimester of the pregnant women. The over prevalence of dyspnea was 27.5 % of which 3 (3.89 %) of them were from the first trimester, 23 (29.87 %) second trimester and 51 (66.23 %) had 3rd trimester with a p-value of 0.001.

Table 2 highlights the clinical features of the pregnant female that were included in the study. To identify the expected association between the clinical features and dyspnea, an independent t-test was applied but there was no significant association with a value of p was 0.321 and 0.813 for glucose and hemoglobin level. However, there is a significant association between dyspnea and the trimesters having a p-value of 0.001. Table 3 highlights the comorbidities among the patients who had dyspnea. Cardiac conditions were more common at 49 (63.63 %), followed by hypertension 19 (24.67 %).

Discussion

Dyspnea, or shortness of breath, emerges as a prevalent occurrence during healthy pregnancies. Surprisingly, around half of women devoid of any prior cardiorespiratory complications experience dyspnea before reaching the 19th week of gestation.[13] This symptom becomes even more pervasive as pregnancy progresses, with a staggering 76% of women reporting dyspnea by the 31st week. Such findings underscore the physiological adjustments and increased demands on the respiratory system that occur during pregnancy, highlighting the importance of monitoring and addressing respiratory symptoms to ensure maternal well-being.[14-16]

Table 1. Distribution of study case based on Trimester

Trimester	Number	Percentage (%)
First trimester	79	28.21
Second trimester	93	33.21
Third trimester	108	38.57

Table 2. Clinical Features of the Participants

Lab Results	Mean ± SD	Min-max	P-value
Glucose (mg/dl)	90.34 ± 32.61	60 - 100	0.813
AST (u/l)	23.21 ± 6.91	8 - 33	0.237
ALT (u/l)	24.10 ± 8.95	0 - 44	0.764
Hb (g/dl)	9.89 ± 2.01	12.1 - 15.1	0.312
ECHO Reports			
sPAP (mmHg	24.62 ± 4.98	30 - 51	
LVEF (%)	54.5 ± 4.41	50 - 70%	
LVESd (mm)	28.45 ± 7.52	39 - 53	
LVEDd (mm)	47.42 ± 2.98	27.5	

A total of 280 pregnant females were included, of which 77 (27.5%) experienced dyspnea with mean age of 29.24 ± 4.17. Different studies also suggested the same findings. In a study, Reeder CF et al reported that dyspnea is typical throughout healthy pregnancies. By the 19th week of being pregnant, approximately fifty percent of the women without previous experience of cardiovascular disease had experienced dyspnea, whereas, at 31 weeks, 76% had confessed to it.[17] The mean age of pregnant women experiencing dyspnea in a different study population was 27.97 ± 6.57, whereas the mean age of the control group remained 30.06 ± 6.57 (19 to 42) (p = 0.211).[18]

In the current study, 79 (28.21%) of them have the first semester, and 93 (33.21%) of the selected women belong to the second trimester, in addition, 38.58% (108) of them have the third trimester. The over prevalence of dyspnea was 27.5% of which 3 (3.89%) of them were from the first trimester, 23 (29.87%) second trimester and 51 (66.23%) had 3rd trimester with a p-value of 0.001. A similar study conducted by Muzaffar T et al that out of the total 323 pregnant women selected for the study, 87 (26.9%) pregnant women experienced dyspnea during their pregnancy, 2 (2.1%) were in the first trimester, 26 (23.2%) belonged in the second trimester, and 59 (50.8%) came in the third trimester.[16]

Physiological changes associated with pregnancy that impact the cardiovascular system may result in complications such as dyspnea. Somani et al. found that peripheral vascular resistance decreased throughout the course of

Figure 1. Prevalence of Dyspnea During Each Trimester

Table 3. Co-Morbidities Among Women with Dyspnea

Condition	Number	Percentage (%)
Hypertension (HTN)	19	24.67
Diabetes (DM)	09	11.68
Cardiac diseases	49	63.63

the pregnancy, whereas increase occurs in stroke volume, ejection fraction and cardiac output.[14] Pregnancy causes a 30% to 50% increase in blood production. Some changes in hemodynamics, such an increase in cardiac output and pulse rate and a decrease in systemic vascular resistance and blood pressure, are also viable possibili-ties. As a consequence, pregnant women who experience dyspnea should have their hemoglobin levels tested.

Pregnancy is associated with a rise in sPAP along with left ventricular end-diastolic pressure (LVEDP) in comparison to the prior-to-pregnancy period.[13] Acute pulmonary edema has become the main cause of dyspnea in pregnant women. In specialized medical facilities, acute pulmonary edema occurs in 1 in 500 patients.[14] Dyspnea is an especially typical sign of an amniotic fluid embolism (AFE). The significant fatality rate associated with this syndrome is caused by uterine placenta bed disruption.[15]

To identify the expected association between the clinical features and dyspnea, an independent t-test was applied but there was no significant association with a value of p was 0.321 and 0.813 for glucose and hemoglobin level. Cardiac conditions were more common at 49 (63.63%), followed by hypertension at 19 (24.67%). Similarly, another study with comparable findings shows that the overall rate of dyspnea across all pregnant women was 40%. Dyspnea had a root cause in 5% of patients, while no cause was detected in 35% of cases. The average age had been 28.5 ± 5 years, the parity was 2 ± 1.4, the period of gestation (POG) was 29.5 ± 3.3 weeks at diagnosis, and it was thirty-six ± 1.5 weeks upon delivery. The frequency of NYHA classes 2, 3, and 4 was 68%, 28%, and 4%, respectively. Anemia 1050 (87.5%), cardiac 7.2%, and other conditions 20 (1.66%) were the most common causes of dyspnea.[19] A previous study carried out by Tabassum M et al. reported comparable results to our study. They reported significant association between dypnea and trimester of pregnancy. They reported cardiac condition in 76.90% patients followed by hypertension in 1.40% and diabetes melitis in 7.70% patients.[20] Another study carried out by Mert et al. also reported significant association of dyspnea with the different trimester of pregnancy. The predominant co-morbidity in their study was cardiac condition.[21]

Conclusion

the current finds that sPAP, left ventricular end-systolic diameter (LVESd), along LVEDd were found to be out of the range considered normal in the current investigation. Additionally, most dyspneic women have cardiac conditions. Therefore, dyspneic women need to have a cardiovascular assessment by doing EECHO, to properly roll out the role of cardiac disease in the development of dyspnea.

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