



TO ASSES DIASTOLIC DYSFUNCTION BY 2D ECHOCARDIOGRAPHY IN WOMEN WITH PREECLAMPSIA DURING THE THIRD TRIMESTER OF PREGNANCY

Obstetrics & Gynaecology

Dr. Priyanka Patel	Post Graduate, Department Of Obstetrics And Gynecology, Sri Siddhartha Medical College And Hospital, Tumkur, Karnataka.
Dr. Indira H	Professor And HOD, Department Of Obstetrics And Gynecology, Sri Siddhartha Medical College And Hospital, Tumkur, Karnataka.
Dr. Girish B L	Professor, Department Of Obstetrics And Gynecology, Sri Siddhartha Medical College And Hospital, Tumkur, Karnataka
Dr. Suchaita M S	Assistant Professor, Department of obstetrics and Gynecology, Sri Siddhartha Medical College and Hospital, Tumkur, Karnataka

ABSTRACT

Background: Preeclampsia is a hypertensive disorder in pregnancy associated with increased maternal cardiovascular risk. Diastolic dysfunction often precedes clinical manifestations and can be detected early with 2D echocardiography. **Methods:** A cross-sectional study was conducted on 90 pregnant women with preeclampsia between 28–40 weeks of gestation at Sri Siddhartha Medical College, Tumkur. Clinical evaluations and 2D echocardiography were Performed. **Results:** The age indicates an predominance of younger women (55.6%) with 51.1% of subjects are primigravida indicating a higher proportion of first time pregnancies in the study populations Blood pressure categorization indicates that a majority of the patients (78.9%) were classified as having non-severe preeclampsia, while 21.1% presented with severe preeclampsia. 2D ECHO assessment revealed grade-1 diastolic dysfunction in 14 (15.6%) Women with non severe preeclampsia and Grade-2 dysfunction in 2 (2.2%) women with severe preeclampsia which indicate higher the grade of diastolic dysfunction, more is the severity of preeclampsia. **Conclusion:** 2D echocardiography is a valuable screening tool for early detection of diastolic dysfunction in preeclampsia women. Early identification may guide risk stratification and improve maternal outcomes.

KEYWORDS

Preeclampsia, Diastolic Dysfunction, 2D Echocardiography, Blood pressure

INTRODUCTION

Preeclampsia is a hypertensive disorder of pregnancy that occurs after 20 weeks of gestation and is characterized by blood pressure more than or equal to 140/90mmhg but less than 160/110mmhg and proteinuria. It is a leading cause of maternal and fetal morbidity and mortality worldwide, affecting approximately 2-8% of all pregnancies.⁽¹⁾

Women with Preeclampsia result in significant changes in the left ventricle, such as left ventricular hypertrophy (LVH) and increased stiffness of the heart muscle. This can impair the ability of the heart to relax and properly fill with blood, leading to diastolic dysfunction. Since the disease often presents after the 20th week of pregnancy, the third trimester is crucial for the identification and management of cardiovascular complications.⁽²⁾

Echocardiography has become a cornerstone in the assessment of cardiovascular function during pregnancy due to its ability to provide real-time images and measurements of heart performance without exposing the mother or fetus to harmful radiation. Specifically, 2D echocardiography, along with Doppler techniques, can help evaluate parameters such as the E/A ratio (which reflects the early and late diastolic filling of the left ventricle). These measurements help detect early-stage diastolic dysfunction that might otherwise go unnoticed, especially in women with preeclampsia who may not exhibit noticeable symptoms.⁽³⁾

MATERIALS AND METHODS-

It was a cross-sectional study, conducted in the Department of Obstetrics and Gynecology at Sri Siddhartha Medical College, Tumkuru. The study duration was 24 months, from April 2023 to March 2025. The Consent was taken after Institutional Ethics Committee approved IEC SSAHE. 90 pregnant women with singleton pregnancy from 28week of period of gestation were recruited in the study. A detailed physical and obstetrical examination was conducted. Routine and Case specific investigations was carried out as mandated by clinical condition of the patients such as RFT LFT, PT, APTT, INR, LDH, ECG, 2D-echocardiography. Patients was followed up till the delivery and development of complications like Eclampsia and other systemic involvement was noted.

Aim:

To assess diastolic dysfunction by 2D echocardiography in patient with preeclampsia in 3rd trimester of pregnancy.

Objectives:

1. To assess the diastolic dysfunction by 2D echocardiography in patient with preeclampsia in 3rd trimester of pregnancy.
2. To correlate diastolic dysfunction with severity of preeclampsia

Inclusion Criteria:

1. All pregnant women between 28 weeks of gestation to term diagnosed with preeclampsia.
2. Singleton pregnancy diagnosed with clinical symptoms and signs of preeclampsia.

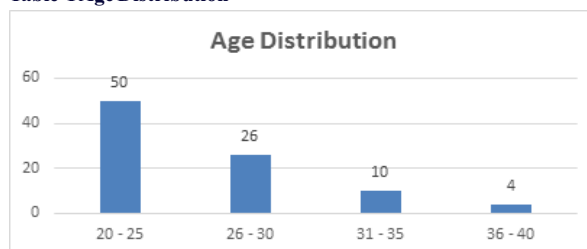
Exclusion Criteria:

1. Women with a history of chronic hypertension or smoking during pregnancy.
2. Women with previous cardiac disorders, previous history of preeclampsia during their first pregnancy.
3. Women above 35 years of age.
4. Women with twin gestation.

RESULTS

A cross-sectional study was conducted on 90 pregnant women diagnosed with preeclampsia during third trimester. The mean age of participants was 25.69 ± 4.31 years, with the majority (55.6%) aged 20–25 years.

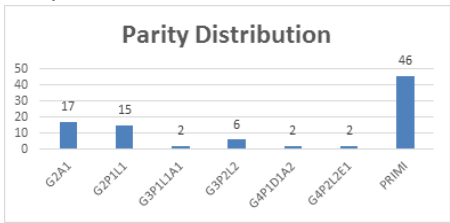
Table-1 Age Distribution



Parity distribution showed Primigravida constituted 51.1% of the study population, indicating a higher incidence of preeclampsia in first-time pregnancies.

Other parity categories include G2A1 (18.9%), G2P1L1 (16.7%), and smaller percentages for G3P1L1A1, G3P2L2, G4P1D1A2, and G4P2L2E1.

Table-2 Parity Distribution



In terms of disease severity, 78.9% of participants had non-severe preeclampsia, while 21.1% had severe preeclampsia. In Echocardiographic, Grade 1 diastolic dysfunction was observed in 14 patients (15.6%), from the non-severe preeclampsia group and Grade 2 dysfunction was observed in 2 patients (2.2%) from severe preeclampsia group. No diastolic dysfunction was found in 74 patients (82.2%).

Table-3 2d Echo Diastolic Dysfunction

2D ECHO Diastolic Dysfunction	Frequency	Percent
Grade-1	14	15.6%
Grade-2	2	2.2%
No Dysfunction	74	82.2%
Total	90	100.0%

Key Echocardiographic Parameters Shown: A statistically significant difference in left ventricular ejection fraction ($p < 0.001$) and S/D ratio ($p = 0.012$) between dysfunction groups. E/A ratio and deceleration time varied across groups, with decay time significantly shorter in Grade 2 dysfunction ($p = 0.035$). There was a significant association between age and diastolic dysfunction ($p = 0.033$), particularly affecting women aged <30 years. However, parity and gestational age did not show statistically significant associations with dysfunction ($p = 0.303$ and $p = 0.220$, respectively). Notably, all patients had normal ECGs, and renal and liver function tests remained within normal limits for most participants, suggesting isolated cardiac involvement.

DISCUSSION

The use of 2D echocardiography provides a non-invasive, accessible, and reliable method to measure key cardiac parameters such as the E/A ratio, deceleration time, left ventricular ejection fraction, and systolic to diastolic time intervals.

Age Distribution-

The age distribution revealed that the majority (55.6%) were aged 20–25 years, followed by 28.9% in the 26–30 years, 11.1% in the 31–35 years, and only 4.4% in the 36–40 years. The overall association was statistically significant ($p = 0.033$), suggesting that younger women, particularly those in the 20–25-year group are more prone to developing diastolic dysfunction. The findings align with the study conducted by Muthyala et al. (2016), who reported a high prevalence of diastolic dysfunction among younger preeclampsia women, with an overall dysfunction rate of 20.8% among their cohort.

Parity Distribution-

Primigravidas constituted 51.1% of the study population, while multiparous groups were distributed as follows: G2A1 in 18.9%, G2P1L1 in 16.7%, and the remaining groups (G3P1L1A1, G3P2L2, G4P1D1A2, and G4P2L2E1) each making up 2.2%. Although the overall p value for parity was 0.303, the trend in the primigravida was a borderline significance (subgroup $p = 0.048$). The increased susceptibility in primigravidas is also supported by data from Caglar et al. (2016), who highlighted that first pregnancies may predispose women to both left and right heart functional changes during preeclampsia.

Period Of Gestation Distribution-

It demonstrated that 37.8% were between 29 and 32 weeks, 24.4% between 32 and 35 weeks, 32.2% between 35 and 38 weeks, and only 5.6% between 38 and 40 weeks, which was not a statistically significant correlation overall. Similarly, Soma-Pillay et al. (2018) noted that early-onset preeclampsia was linked to persistent diastolic dysfunction postpartum, underlining the clinical relevance of gestational timing in disease severity.

No statistically significance was found with respect to RFT LFT, PT, APTT, INR, LDH, ECG in majority of preeclampsia women

Blood Pressure Categories-

It revealed that 78.9% were classified as having non-severe preeclampsia (blood pressure $\geq 140/90$ but $<160/110$ mmHg), while 21.1% exhibited severe preeclampsia (blood pressure $\geq 160/110$ mmHg). Levine et al. (2019) concluded that severe hypertensive states in preeclampsia women were linked to impaired systolic and diastolic indices, emphasizing the prognostic significance of blood pressure severity.

2d Echo Diastolic Dysfunction Frequency-

2D echocardiographic assessment revealed that 15.6% of the 90 preeclampsia women exhibited Grade 1 diastolic dysfunction, while 2.2% showed Grade 2 dysfunction; 82.2% of the patients had no evidence of diastolic dysfunction. The overall association between BP category and diastolic dysfunction was statistically significant ($p = 0.039$), suggesting that the severity of hypertension in preeclampsia may influence the type and degree of diastolic dysfunction observed. Pillai et al. (2021) observed that the prevalence of diastolic dysfunction was significantly higher in women with early-onset preeclampsia showed lower prevalence (22.5%).

Association Between Bp And 2d Echo Diastolic Dysfunction-

Our data were categorized into non-severe preeclampsia (BP $\geq 140/90$ but $<160/110$ mmHg) and severe preeclampsia (BP $\geq 160/110$ mmHg). In the non-severe group ($n=70$), 14 patients exhibited Grade 1 dysfunction, with no cases of Grade 2 dysfunction, resulting in a combined dysfunction rate of 18.3%. Conversely, in the severe preeclampsia group ($n=20$), there were no cases of Grade 1 dysfunction, but 2 patients presented with Grade 2 dysfunction, leading to a combined dysfunction rate of 15.8%. The overall association between BP category and diastolic dysfunction was statistically significant ($p = 0.039$), suggesting that the severity of hypertension in preeclampsia may influence the type and degree of diastolic dysfunction observed. Muthyala et al. (2016) found that severe preeclampsia was associated with a significantly higher rate of diastolic dysfunction (39%), with a larger proportion of Grade II dysfunction compared to mild cases

CONCLUSION-

The present study provides a comprehensive evaluation of cardiac function in preeclampsia women during the third trimester, revealing important insights into the subtle alterations in diastolic function that may not be apparent through routine clinical evaluation. Those with severe preeclampsia had Grade 2 diastolic dysfunction, while those with mild preeclampsia exhibited Grade 1 dysfunction. Higher severity of preeclampsia correlated with a higher incidence of Grade 2 diastolic dysfunction. Collectively, these findings emphasize the importance of incorporating advanced cardiac imaging techniques, such as 2D echocardiography, into the routine assessment of preeclampsia patients. By detecting subtle changes in myocardial relaxation and diastolic function, clinicians can better stratify risk and potentially implement targeted interventions aimed at mitigating the long-term cardiovascular consequences associated with preeclampsia.

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