

Original Research Article

# A cross sectional study on antenatal women of third trimester for screening of cardiomyopathy

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## Abstract

**Background:** Peripartum cardiomyopathy/cardiomyopathy in pregnancy is seen with no other cause of heart failure, heart chamber may or may not be dilated. Due to greater knowledge and attention towards the disease increasing incidence and prevalence has been noted.

**Objectives:** 1. To estimate prevalence of cardiomyopathy in third trimester antenatal women attending antenatal care at Kamla Raja Hospital, Gwalior. 2. Identify independent predictors of cardiomyopathy. 3. Study ECG and ECHO changes in third trimester antenatal women with cardiomyopathy. 4. Study maternal outcome in terms of morbidity, mortality and ICU attendance.

**Methodology:** A cross sectional study on 184 antenatal women was conducted at Department of Obstetrics and Gynaecology, Kamla Raja Hospital, Gwalior. Study population included antenatal women attending antenatal care during third trimester. Study was conducted for a period of one year from October 2021 to September 2022.

**Results:** Out of 184 antenatal women in third trimester, prevalence of cardiomyopathy was found to be 1.09% and in those patients moderate LV dysfunction was seen. All the patients were multipara and low BMI and anaemia was associated.

**Conclusion:** Routine cardiomyopathy screening of antenatal women in third trimester will optimize maternal care during antenatal period.

**Keywords:** ANC, LV, CMP, ECG, ECHO

## 1. Introduction

Cardiomyopathy is defined as a myocardial disorder in which heart muscle is structurally and functionally abnormal in absence of coronary artery disease presenting hypertension valvular disease and congenital heart disease to cause myocardium dysfunction.<sup>1</sup>

Peripartum cardiomyopathy (PPCM) is defined as symptoms of heart failure secondary to left ventricular systolic dysfunction with an ejection fraction < 45% towards the end of pregnancy in months following delivery with no other cause of heart failure. LV may/may not be dilated.<sup>2</sup>

Highest incidence is reported in African countries and lowest is reported in Scandinavia and Japan. Increase reporting is due to greater knowledge about disease.<sup>1</sup>

Symptoms is majority develops in 1<sup>st</sup> 4<sup>th</sup> month after delivery and only 9% present in last month of pregnancy.

Pathophysiology includes pregnancy induced increased stroke volume, increase heart rate, decrease systemic vascular resistance of heart. Concentric remodeling hypertrophy, tachycardia, oxidative stress, inflammation especially interferon  $\gamma$ , viruses, autoimmune responses.

Predisposing factors include: multiparity, African ethnicity, malnutrition, extremes of age, preeclampsia, diabetes and smoking.

IN this cross sectional study, we set out to assess prevalence of cardiomyopathy in third trimester ANC and identify independent predictors contributing to it to optimise maternal case in terms of morbidity and mortality.

## 2. Material and Methods

This was a cross sectional study on 184 patients women attending antenatal care from October 2021 to September 2022 were included.

### Inclusion criteria:

- Third trimester pregnant women attending antenatal care at Department of Obstetrics and Gynaecology, KRH and J.A. Group of Hospitals, Gwalior.
- Absence of preexisting heart disease

### Exclusion criteria

- Women during first and second trimester.
- Third trimester ANC with preexisting heart disease.

**Data collection:** Women were selected based on above inclusion and exclusion criteria.

Data was collected on demographic characteristics, obstetrics history, menstrual history, personal and past history. Gestational age was calculated from data of last menstrual period (LMP) or by first trimester of USG if LMP was not available.

Asked for symptoms present or not, if present then noted. Complete general systemic and abdominal examination was performed. Antenatal records and investigations done along with ECG and ECHO.

**Maternal** predictors evaluated for contribution of risk

1. Demography
2. Obstetric history
3. Booking status
4. Direct/referred
5. Symptoms and signs

Maternal outcome were studied in terms of ECG changes, ECHO changes, ICU admission, mortality.

## 3. Results

Out of 184 patients, mean age was found to be 26 years, mean gestational age 34 weeks.

Out of 184 patients, table 1 depicts that 55.98% were primipara, 40.22% were multipara and 3.8% were grand multipara.

**Table 1:- Distribution of patients according to gravida and parity**

Parity	Frequency	Percentage
Primipara	103	55.98
Multipara	74	40.22
Grandmultipara	7	3.8

Table 2 depicts that out of 184 enrolled mothers, 81% was enrolled from Gwalior city and 19% from other nearby locality.

**Table 2 :- Distribution of Patients according to locality**

Locality	Frequency	Percent
BHIND	7	3.8
BILAUA	4	2.2
DABRA	1	0.5
DATIA	7	3.8
DHOLPUR	1	0.5
GWALIOR	149	81
MORENA	8	4.3
SHIVPURI	7	3.8
Total	184	100

Table 3 depicts that all patients were direct patients and none of them enrolled came to center as referral.

**Table 3 :- Distribution of Patients according to referral**

Direct/Referred	Frequency	Percent
DIRECT	184	100

Table 4 depicts that 75.5% patients were unbooked and 24.5% were booked cases.

**Table 5 :- Distribution of Patients according booked/unbooked**

Booked/Unbooked	Frequency	Percent
Booked	45	24.5
Unbooked	139	75.5
Total	184	100

Table 5 depicts that among all patients 88% were asymptomatic and 12% were symptomatic. Majority among symptomatic complaint of Ghabrahat followed by chest pain followed by dyspnea and followed by edema.

**Table 5:- Distribution of Patients according to symptoms**

Symptoms	Frequency	Percent
Asymptomatic	162	88
Chest pain	4	2.2
Dyspnea	3	1.6
Dyspnea on exertion	1	0.5
Gabrahat	12	6.5
Leg swelling	1	0.5
Swelling in body	1	0.5
Total	184	100

Table 6 depicts that out of 184 patients, in 99.8% patients JVP was not raised and in 2.2% antenatal patients JVP was raised.

**Table 6 :- Distribution of Patients according to JVP**

JVP	Frequency	Percent
Raised	4	2.2
Not Raised	180	97.8
Total	184	100

Table 7 depicts ECG changes were seen only in 0.5% patients.

**Table 7 :- Distribution of Patients according to Electrocardiography**

ECG changes	Frequency	Percent
Normal sinus rhythm	178	96.7
Sinus Tachycardia	5	2.7
Sinus tachycardia, left axis deviation	1	0.5
Total	184	100

Table 8 depicts that out of total 184 ANC, 82.1% showed no valve regurgitation. 0.1% showed severe tricuspid regurgitations , rest of them showed mild changes.

**Table 8:- Distribution of Patients according to Echocardiography**

MR/TR/Other features	Frequency	Percent
Mild MR, Mild TR	1	0.5
Mild -Moderate MR, Mild AR	1	0.5
MILD MR	17	9.2
MILD TR	12	6.5
NO ABNORMALITY	151	82.1
Severe TR	1	0.5
trace pericardial effusion	1	0.5
Total	184	100

Table 9 depicts that 98.9% showed normal cardiac chamber dimensions, 0.5% showed dilated left ventricle and 0.5% showed both dilated left atrium and ventricle.

**Table 9:- Distribution of Patients according to Echocardiography**

Cardiac chamber dimensions	Frequency	Percent
dilated left ventricle	1	0.5
Dilated left atrium and left ventricle	1	0.5
WNL	182	98.9
Total	184	100

Table 10 depicts that out of total 184 ANC, only 0.5% showed global LV hypokinesia and 99.5% showed no regional wall motion abnormality.

**Table 10 :- Distribution of Patients according to Echocardiography**

Regional Wall Motion Abnormality	Frequency	Percent
Global LV hypokinesia	1	0.5
No RWMA	183	99.5
Total	184	100

Table 11 depicts that mean LVEF was found to be 60% and PASP is 27.8 mm.

**Table 11 :- Distribution of Patients according to ventricular function**

	Mean	Std. Deviation
LVEF	60	2.53
PASP	27.8	4.89

Table 12 showed that 1.6% had ICU admission.

**Table 12 :- Distribution of Patients according to maternal morbidity**

Maternal morbidity	Frequency	Percent
ICU admission at the time of admission	3	1.6
No cardiac morbidity	181	98.4
Total	184	100

During the study, the mean hemoglobin value was found to be 9.84 gm, but participants with severe anemia were found to be more prone to cardiomyopathy and other symptomatic changes. No maternal mortality was seen in study.

#### 4. Discussion

Cardiomyopathy is defined as a myocardial disorder in which the heart muscle is structurally and functionally abnormal in the absence of coronary artery disease, hypertension, valvular disease and congenital heart disease sufficient to cause the observed myocardial abnormality.

Peripartum Cardiomyopathy: PPCM is defined as symptoms of heart failure secondary to left ventricular systolic dysfunction with an ejection fraction <45% towards the end of pregnancy or in months following delivery with no other cause of heart failure. LV may/may not be dilated.

This study was a cross sectional study conducted in the department of obstetrics and gynecology of Kamla raja hospital & J.A. group of hospital, Gwalior. Total 184 mothers enrolled at 3<sup>rd</sup> trimester of ante natal period. With the aim to determine the effect of cardiomyopathy in 3<sup>rd</sup> trimester women attending antenatal care at Kamla Raja Hospital Gwalior.

In this study demographic variable compared in between enrolled mother like age, gestational age, systolic BP, Diastolic BP, height, weight, BMI and locality. Other studies like **Gunderson et al**<sup>3</sup> and **Roos-Hesselink et al**<sup>4</sup> also compared the same variables like this study.

Among total 184 enrolled parturient 55.98% were primi, 40.22% were multi and only 3.8% were grand multipara and got the similar results like other studies in which they also compared in their respective studies as **Boyle et al**<sup>5</sup>, **Avila et al**<sup>6</sup> and **van Hagen et al**<sup>7</sup>.

Locality also taken into consideration as variable in which the maximum patients were found to come from urban locality. **Murali et al**<sup>8</sup> and **Sliwa et al**<sup>9</sup> gave similar results and came with the conclusion that majority of the patient enrolled from urban locality itself but study conducted **Grewal et al**<sup>10</sup> came with different results that majority of the patients belonged to rural locality.

Among total 184 cases were enrolled in which 100% cases were direct admission in contrast with study conducted by **Masoomi et al**<sup>11</sup> in which one third of the patient referred

to the study hospital and remaining were of direct admission.

Among total enrolled mothers (n=184), 24.5 % were booked cases (n=45) and 75% were unbooked (n= 139) in this study. Previously majority of the studies did not compare booked or unbooked criteria in their respective studies.

Among all participants, majority of them were asymptomatic (88%). Only few were having clinical symptoms in which highest number of participants 6.5% (n=12) were having ghabrahat followed by chest pain in 2.2% (n=4). Only 1.6% cases were having dyspnea and only 1 case found to be of oedema over legs and body and dyspnea on exertion. Anemia especially severe anemia was found to be significantly associated with development of cardiomyopathy. Other previous studies done by **Masoomi et al<sup>11</sup>**, **Murali et al<sup>8</sup>** and **Avila et al<sup>6</sup>** also favors the observation and results of this studies and found that dilated cardiac myopathies are more common in the pregnant women with comorbidities. Parturient of this study was also compared for association of dilated cardiomyopathies with Juglar venous pressure and found out that Only 2% (n=4) patients found with raised JVP and 180 among total 184 cases found to be normal. Similarly **Nanna et al<sup>12</sup>** also observed raised JVP in the women of antenatal period with cardiac myopathy.

During electro cardiography 2.7% (n= 5) were having sinus tachycardia and only 0.5% (n= 1) was found with sinus tachycardia with left axis deviation among total 184 enrolled cases and rest of them found to be normal in terms of electro cardio graphic changes similarly **Boyle et al<sup>5</sup>**, **Gunderson et al<sup>3</sup>** and **Sliva et al<sup>9</sup>** also had ECG changes among parturients.

During echo cardiography Maximus parturients 151 were found to have normal echocardiography and maximum number of the patients (n=17) were having mild MR followed by mild TR (n= 12). Only 1 patient each found to have mild MR-TR both , mild to moderate MR- AR, severe TR and trace pericardial effusion and observed 1 patient with dilated left ventricle , 1 had dilated left atrium and left ventricle and 182 parturient were found to be with in normal limits among total 184 cases with 2 were having moderate left ventricle dysfunction and mean LVEF was 60 was observed with 27.8 PASP. In other studies like **Avila et al<sup>6</sup>** and **Sliwa et al<sup>9</sup>**, **Mc Namara et al<sup>13</sup>** and **Elkayam et al<sup>14</sup>** also took the echocardiographic changes into consideration in the participants of the respective studies in which they observed reduction in the ejection fraction of right and left ventricles and ventricular dysfunction and LVEF recovery and its clinical outcome

In the follow up of antenatal women with cardiomyopathic changes with reduced ejection fraction post delivery after few months ejection fraction was found to be improved similar study was conducted by **Goland et al<sup>15</sup>** to know maternal and fetal outcome at birth and after 6 months

In the study conducted maternal ICU admission and mortality was studied in which mortality was found to be 0% similar study was conducted by **Autore et al<sup>16</sup>** to assess mortality and morbidity in pregnant women with cardiomyopathy and found that maternal mortality was increased in patient with hypertrophic cardiomyopathy compared with general population and in presence of favourable clinical profile progression of symptoms are also uncommon.

## 5. Conclusion

Prevalence of cardiomyopathy in our study was found to be 1.09% and in those patients moderate LV dysfunction was seen. All the patients were multipara and low BMI and anaemia was associated.

All pregnant women should be screened for cardiomyopathy during their antenatal visit which will help to optimize maternal care during antenatal period. 2D ECHO of mothers

with comorbidities should be done to rule out any cardiomyopathy especially during third trimester visit

#### COMPLIANCE WITH ETHICAL STANDARDS:

The author declares no conflicts of interest to the contents of this manuscripts and study was approved by institutional ethical committee.

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