

Clinical Outcomes of Gravidocardiac Patients in Silliman University Medical Center from January 2015 to December 2019: A Retrospective Study

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Abstract

Background. Cardiac disease increases morbidity and mortality in pregnant patients. This is found in both developing countries and underdeveloped countries. Cardiovascular demand increases with pregnancy, causing additional stress on a diseased heart. This then poses a greater risk of complications; thus, specialized care involving an Obstetric-Gynecologist and a Cardiologist is warranted.

The Modified WHO Classification of Maternal Cardiovascular Risk, CARPREG, and CARPREG II predict risk among gravidocardiac patients and corresponding needed medical attention perinatally. Little data has been known on the clinical outcomes of pregnancy among gravidocardiac patients in the Philippines.

This study aims to gauge the clinical outcomes of gravidocardiac patients admitted to a tertiary hospital in Dumaguete City.

Methods. A retrospective, cross-sectional descriptive study was carried out among all gravidocardiac patients admitted for labor and delivery between January 2015 and December 2019. A chart review of the cases satisfying the inclusion criteria was done. Data gathered were tabulated, and a Chi-Square was used to assess if there was a significant relationship between the cardiac condition and the mode of delivery, duration of pregnancy, maternal outcomes, and fetal outcomes.

Results. Cardiac lesions noted among gravidocardiac patients include mitral valve prolapse, which comprised the majority of cases, patent ductus arteriosus, ventricular septal defect, mitral valve regurgitation, aortic valve regurgitation, atrial septal defect, and peripartum cardiomyopathy. Pregnancies were mainly carried to term with vaginal delivery as the primary mode of birth. Maternal outcomes were generally favorable, with no deaths recorded. Fetal outcomes were variable among cases, and fetal mortality was recorded at 3.92%. A significant relationship was seen between maternal cardiac condition and maternal outcomes of the pregnancies.

Conclusion. Among pregnant patients with cardiac conditions, maternal outcomes of pregnancy can be predicted in association with the cardiac condition. There is a great need to educate the public on the need for proper perinatal care when a cardiac condition in pregnancy is detected.

Keywords: gravidocardiac, heart disease in pregnancy, maternal outcomes

Introduction

Pregnancy brings forth dynamic changes to the body to accommodate a new life. Such a stage presents challenges to a woman's body, increasing her morbidity and cardiovascular complications.

Heart disease has been linked to cause the most deaths among pregnant patients in both developed and underdeveloped countries. It has been estimated that around 0.5% to 3% of women have heart disease either diagnosed prior to pregnancy or noted during pregnancy.¹

In the Philippines, little data has been known about cardiac disease in pregnancy. The Department of Health data has never delineated cardiac complications in pregnancy as a cause of maternal mortality and poor

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birth outcomes. Heart disease in pregnancy has been identified as the most important non-obstetric cause of maternal mortality in our country.

Women of childbearing age with cardiac disease in the Philippines have been thought to have an increased risk of cardiac complications due to poor access to medical attention. Women in far-flung areas in our country are not able to seek medical care from specialists who can decrease their morbidity during pregnancy.

Reproductive-age women with heart disease who are considering pregnancy should be counseled to seek consultation with a cardiologist with expertise in pregnancy and heart disease. A multidisciplinary team is then needed to care for such patients once pregnant. The patient should seek shared care with an obstetrician and a cardiologist. Pre-conceptual assessment and counseling should always consider both maternal and fetal risk.¹⁻²

Pregnancy comprises several hemodynamic changes that correspond to the increasing demands of pregnancy. To supply the needed additional blood to the growing fetus, the blood volume and resulting cardiac output have to increase up to 50% from baseline. The systemic vascular resistance decreases by 20% to accommodate the increased blood volume. Heart rate can increase by 10 to 20 beats per minute, peaking by the first month of the 3rd trimester. All these factors lead to an additional workload on the heart, thus placing the gravidocardiatic patient at risk of heart failure.^{2,4}

According to the European Society of Cardiology (ESC) Guidelines on Cardiovascular Disease during Pregnancy, gravidocardiatic patients can be classified into three levels according to the Modified WHO classification of maternal cardiovascular risk.

The classification aims to stratify patients into perinatal morbidity risks with the corresponding care needed based on the patient's condition. WHO I pertain to women with very low risk, and cardiology check-ups may be limited to once or twice. WHO II suggests low to moderate risk, and one visit per trimester to a cardiologist is necessary. WHO III corresponds to a high risk of maternal complications, and monthly or even bimonthly visits to the obstetrician and cardiologist are necessary. Patients scored with WHO IV are contraindicated to undergo pregnancy, and if pregnancy is present, termination may be contemplated.³

The mode of delivery for women with heart disease has been an issue over the years, and conflicting data can be drawn between different papers. The ECS guidelines suggest better outcomes with vaginal delivery, but the cesarean section is strongly indicated in a couple of cases. Conditions such as patients with Marfan Syndrome, aortic diameter >45mm, acute or chronic aortic stenosis, and those who are in acute intractable heart failure are advised to undergo a cesarean section instead of vaginal delivery.⁵

The Cardiac Disease in Pregnancy (CARPREG) risk score consists of four factors that predict pregnancy-related

cardiovascular complications among women. The score includes aspects such as (1) prior heart failure or arrhythmia, (2) left-sided obstructive lesions, (3) poor functional status based on the New York Heart Association (Class II or greater), and (4) left ventricular ejection fraction (LVEF) less than or equal to 40%.⁷

A newer risk scoring, the CARPREG II, was developed in 2018 to incorporate other factors, such as general cardiac variables and factors related to the process of care, which can predispose the gravidocardiatic patient to complications. Such risk stratification included 10 predictors, translating to the predictions of primary cardiac events during pregnancy.⁸

In the Philippines, a study done at the Philippine Heart Center recorded that 47% of pregnancies among women with cardiac disease had maternal cardiac events. Unfavorable fetal outcomes among such patients were noted to occur in 38% of pregnancies.⁶

A study at Philippine General Hospital noted favorable maternal and fetal outcomes among patients with peripartum cardiomyopathy.⁹

The study aimed to describe the clinical outcomes of gravidocardiatic patients admitted at Silliman University Medical Center from January 2015 to December 2019. Specific objectives of the study were to determine the demographic profile, the percentage of distribution of cases of gravidocardiatic patients, the pregnancy outcomes of gravidocardiatic patients in terms of duration of pregnancy, mode of delivery, maternal outcomes, and fetal outcome, and if a significant relationship exist between the patient's cardiac condition and the outcomes of their pregnancy

Methods

A retrospective, cross-sectional descriptive study was carried out, which entailed a review of all gravidocardiatic patients admitted at Silliman University Medical Center from January 2015 to December 2019. Data was obtained from patient charts within the study period.

Research subjects included pregnant patients with cardiac conditions previously diagnosed or diagnosed during the current hospitalization who were admitted for labor and delivery. Cardiac conditions in this study include congenital, valvular, and peripartum cardiac lesions. Patients excluded in this study were pregnant patients admitted for other causes aside from labor and delivery and patients with other factors complicating their hospitalization, such as infection, trauma, malnutrition, etc.

Total population sampling with a purposive sampling technique was used in the study. All available cases that fit the inclusion criteria within the study period were utilized for the research.

A chart review of all gravidocardiatic patients admitted for labor and delivery was carried out, and collection of needed data was done. Charts with incomplete data were disregarded and were excluded from the study.

Table I. Demographic Data and Baseline Characteristics of Subjects

Demographic Profile of the Subjects		
Age (years)	Frequency	Percentage
Below 20	5	9.80
20-34	39	76.47
≥ 35	7	13.73
Total	51	100.00
Civil Status		
Single	20	39.22
Married	31	60.78
Total	51	100.00
Parity		
Primiparous	27	52.94
Multiparous	24	47.06
Total	51	100.00
Attending Physician		
Obstetric Gynecologist only	20	39.22
Obstetric Gynecologist and Cardiologist	31	60.78
Total	51	100.00

Table II. Outcomes of Pregnancy

	Frequency	Percentage
Duration of Pregnancy		
Term	33	64.71
Preterm	18	35.29
Total	51	100.00
Mode of Delivery		
Vaginal	33	64.71
Caesarian Section	18	35.29
Total	51	100.00
Maternal Outcome		
Uncomplicated Maternal Course	44	86.27
Prolonged Maternal Hospital Stay	7	13.73
Death	0	0
Total	51	100.00
Fetal Outcome		
Uncomplicated Fetal Course	45	88.24
Prolonged Fetal Hospital Stay	4	7.84
Fetal Death	2	3.92
Total	51	100.00

Descriptive statistics were used to assess the demographic profile, cardiac condition, and outcomes of pregnancies were obtained. A chi-square was then used to assess if there was an association between the cardiac condition and the outcomes of the pregnancies.

Results

Between January 2015 and December 2019, a total of 55 cases of gravidocardiac patients admitted and eligible for inclusion in the study were recorded. Of these cases, 4 (7%) were excluded due to missing clinical data. *Table I* shows the demographic data and baseline characteristics of the 51 subjects included in this study.

The study population comprised 39 (76.47%) pregnancies among the age group of 20 to 34 years old, five (9.80%) among women below 20 years of age, and seven (13.73%) among women 35 years old and beyond. The civil status of the study group comprised 31 (60.78%) married subjects and 20 (39.22%) who reported their status as single. Primiparous patients comprised 52.94% (27) of cases, while multiparous patients were 47.06% (24). An Obstetrician and a Cardiologist attended most subjects (31 patients or 60.78%); a minority of 20 patients (39.22%) were attended only by an Obstetrician during their hospital stay.

Patients with mitral valve prolapse comprised the majority, or 68.63% (35 cases) of the study participants. This was followed by patent ductus arteriosus (9.8% or 5 cases), ventricular septal defect (8.84% or 4 cases), mitral valve regurgitation (3.92% or 2 cases), aortic valve regurgitation (3.92% or 2 cases), atrial septal defect (3.92% or 2 cases) and peripartum cardiomyopathy (1.96% or 1 case).

Pregnancy outcomes among subjects were described in terms of duration of pregnancy, mode of delivery, maternal outcomes of the pregnancy, and fetal outcomes (*Table II*). Term pregnancies were 64.71% (33 cases) of the total subject population, while preterm pregnancies correspond to 35.29% (18 cases).

Vaginal birth was seen in 64.71% (33) of cases compared to 35.29% (18) who delivered via cesarean section. Indications seen for cesarean section delivery were arrest in cervical dilatation, non-reassuring fetal status, cephalopelvic disproportion, prolonged latent phase, borderline oligohydramnios, prolonged deceleration phase, and maternal indication (severe pulmonary hypertension).

Maternal outcomes were generally good among subjects. No death was recorded, with 86.27% (44) having uncomplicated maternal course and 13.73% (7) with prolonged hospital stay due to cardiac complications.

Fetal outcomes among gravidocardiac patients included 88.24% (45) uncomplicated fetal course. They were able to be discharged with the mother or earlier than the mother, 7.84% (4) prolonged fetal hospital stay and perinatal fetal mortality was at 3.92% (2).

Information obtained from charts was coded to facilitate the analysis of data. Using chi-square, we determined if an association is seen between the maternal cardiac condition and the clinical outcomes of the pregnancies. As seen in *Table III*, the maternal cardiac condition has no significant relationship with the mode of delivery, the duration of pregnancy, and the fetal outcomes. A significant relationship was seen between the maternal cardiac condition and the maternal outcome of pregnancy, where the chi-square was computed at 18.28 with a confidence interval of 95%.

The relationship between maternal cardiac condition and pregnancy outcome can be seen in *Table IV*. Patients with mitral valve prolapse have a 5.71% risk of prolonged

Table III. Association between cardiac condition and clinical outcomes

Clinical Outcome	Chi-Square		Degrees of Freedom
	Computed	Tabular	
Mode of Delivery	12.51	12.59	6
Duration of Pregnancy	6.77	12.59	6
Maternal Outcome	18.28*	12.59	6
Fetal Outcome	17.45	21.03	12

Table IV. Maternal Cardiac Condition and Maternal Outcomes of Pregnancy

Cardiac Condition	Uncomplicated Maternal Course	Prolonged Hospital Stay
Mitral Valve Prolapse	33	2
Patent Ductus Arteriosus	3	0
Ventricular Septal Defect	3	2
Mitral Regurgitation	3	1
Aortic Regurgitation	2	0
Atrial Septal Defect	0	1
Peripartum Cardiomyopathy	0	1
Total	44	7

hospital stay with a 94.29% having an uncomplicated hospital course. Patients with patent ductus arteriosus and aortic regurgitation have good maternal outcomes. Sixty percent of gravidocardiac patients with ventricular septal defects will have an uncomplicated maternal course, while 40% will have a prolonged hospital stay. Seventy-five percent of patients with mitral regurgitation have better maternal outcomes compared to 25% having prolonged hospital stay. Increased maternal morbidity was seen among patients presenting with atrial septal defect and peripartum cardiomyopathy.

Discussion

The majority of the patients recorded in the study were within the age group of 20 years to 34 years. This data is consistent with other studies on pregnant women with cardiac conditions. Women might be more knowledgeable about high-risk pregnancies at an early age or increasing age in the background of a cardiac lesion.

Various cardiac lesions were found among pregnant patients with cardiac disease who were seen at Silliman University Medical Center. These lesions fall into the categories of congenital heart disease, valvular heart disease, and cardiomyopathy. Compared to studies in Western countries with rheumatic heart disease and congenital heart disease as the leading cardiovascular condition, valvular heart disease, particularly mitral valve prolapse, was the dominant lesion among gravidocardiac patients in this study. This disparity might

be secondary to improved health care and decreased incidence of rheumatic heart disease in the locality.

Term deliveries and vaginal birth predominantly recorded among the subjects are consistent with global data among pregnancies in patients with cardiac disease. This can be attributable to good perinatal care and compliance with medical advice. This statistic is generally seen in most studies on gravidocardiac patients.

Maternal outcomes of the pregnancies were generally good, with no maternal mortality recorded. Cardiac lesions seen in the study fall among the low to moderate lesions based on the Modified WHO Classification of Maternal Cardiovascular Risk. This finding is consistent among studies and is expected with adequate and competent care being given. Complications of heart failure and arrhythmias were seen in 13.73% of patients who had prolonged maternal hospital stay. This is consistent with the data from a study by Pillutla et al., where they recorded that 31% of gravidocardiac patients had cardiac complications of heart failure and arrhythmias.¹⁰ Patients who had cardiac events during their hospital stay were managed according to the complications that were seen. Intensive care unit admissions were noted in all cases who had prolonged maternal hospital stays.

The majority of pregnancies resulted in good fetal outcomes, with 88.24% uncomplicated fetal courses. This trend was also seen in a study by Manh TN et al., where pregnant patients with cardiovascular disease were not seen to be at high risk of adverse fetal outcomes.¹¹ Two fetal deaths seen in the study can be ascribed to premature birth and the complications with a preterm neonate.

The association between maternal cardiac lesions and maternal outcomes is consistent with the Modified WHO Classification of Maternal Cardiovascular Risk and the CARPREG II risk score. Validating the risk stratification of the two classification systems, the researchers recommend using the scoring in future gravidocardiac patients in the hospital. The use of the scoring stratifications also would aid the health care team on the level of medical attention that needs to be addressed perinatally.

The care of pregnant patients with heart disease would warrant a team of specialists to address the possible complications that may arise. An Obstetric-Gynecologist and a Cardiologist saw most subjects. In an ideal setting with available specialized care, a neonatologist, cardiovascular surgeon, and pediatrician should be involved in all stages of pregnancy. Specialized care should commence during pregnancy planning in patients with known cardiac conditions.

Conclusion

Cardiovascular disease has been seen to affect the clinical outcomes of pregnancy among patients. In this study, we saw a correlation between the cardiac condition of the subject and the maternal outcome of her pregnancy. This data can be used to identify and educate

patients on the possible maternal morbidity corresponding to their cardiac condition. The mode of delivery, duration of pregnancy, and fetal outcomes are variable among cardiac conditions and might be affected by other factors. Gravidocardiac patients, when detected, should be referred, and handled by specialists to decrease morbidity and address other concerns about the pregnancy. Compliance with perinatal care should be emphasized since cardiac conditions are still the leading cause of global maternal mortality.

There is a need to educate reproductive-age patients on the screening and early detection of possible cardiac conditions that may affect pregnancy outcomes. When the cardiac disease has been detected, and pregnancy has been contemplated, a team with an Obstetric-Gynecologist specializing in high-risk pregnancies and a Cardiologist is warranted to bring about better pregnancy outcomes.

Limitations. The study was a chart review of previously admitted patients. Charts with incomplete data were disregarded and were excluded from the study. A prospective study in line with this topic can be done to decrease the possibility of missed data.

Ethical Considerations The study involved a chart review of gravidocardiac patients admitted at Silliman University Medical Center between January 2015 and December 2019. In all phases of the research procedure, personal information was kept private, and anonymity was maintained. All data collected was treated with confidentiality, and whenever information was shared, it was done between researchers during the defense of the study and other related education activities.

Privacy and Confidentiality. No direct patient interaction and contact was done. Patient confidentiality and anonymity were always applied. All collected data were coded and summarized in a Microsoft Excel file, saved in at least two password-protected computers. Coded entries ensured confidentiality and anonymity and reduced bias on the side of the statistician.

Competing interest. The investigators had nothing to declare.

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