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MATERNAL & FETAL OUTCOMES IN PREGNANCIES WITH CARDIAC DISEASES: A TERTIARY CARE CENTRE STUDY

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Abstract

Introduction/background

Cardiac disease complicating pregnancy is an important cause of maternal mortality and morbidity both in antepartum and postpartum period. The overall incidence of heart disease in pregnancies <1%. Challenges in the management have increased because successful treatment of congenital heart diseases has created a new population who are able to reach the childbearing age and pregnancy in older women who are susceptible to heart disease acquired in adulthood.

Study Design: prospective study

Aim: To determine outcome in pregnant women with heart diseases in terms of maternal and fetal outcome, complications and mode of delivery.

Methods: The study was conducted in the Department of Obstetrics & Gynecology at Yenepoya Medical College Hospital (Deemed to be University) Karnataka, India from August2023 to August 2024. Women with heart diseases who were previously established or diagnosed first time during pregnancy, we re-enrolled in the study.

Results: In the present study, the incidence of cardiac disease in pregnancy was 0.77%, with Rheumatic Heart Disease constituting 5 out of 12 patients (41.66%), Congenital Heart Disease 3 out of 12 patients (25%), Miscellaneous 3 out of 12 patients(25%), Post cardiac surgery 1 out of 12 patients (8.33%). Among the women who had RHD, valvularHeart disease was the most common. With Mitral valve most commonly being involved, lesions such as Mitral stenosis and Mitral regurgitation were frequently diagnosed which was followed by multi-valvular disease. Among the women with Congenital Heart Disease, major lesions were ASD and VSD. Cardiac failure developed in 2 women out of 12 (16.66%), whose NYHA class changed from class I/II to class III/IV. 5 out of 12 patients (41.66%) had vaginal delivery, 2 out of 12 patients (16.66%) had

assisted instrumental vaginal delivery, 16.66% of women were delivered by C-section and 8.33% had first trimester abortions and 2 (16.66%) maternal deaths were recorded. Adverse perinatal outcomes in the form of preterm delivery, NICU admission, IUGR, perinatal morbidity and mortality were also noted.

Conclusion: The cardiac disease has a major impact on pregnancy. During the study period 16.66% cases of maternal mortality were documented due to cardiac failure and cardiopulmonary arrest hence a multidisciplinary teamwork is mandatory to have optimal maternal and fetal outcome with constant monitoring required through antenatal, intrapartum and postpartum period to avoid adverse outcomes. Study also concluded that pre-pregnancy diagnosis, counseling, appropriate referral, antenatal supervision and delivery at tertiary care centers is essential to improve the maternal and neonatal outcome in pregnant women with cardiac disease.

Key-words: pregnancy, maternal and fetal outcomes, cardiac diseases, RHD, CHD.

INTRODUCTION

Cardiac disease is one of the important causes of maternal mortality and morbidity both in antepartum and postpartum period. Cardiac disease in pregnancy is broadly divided into congenital and acquired. The acquired group includes RHD, cardiomyopathies and ischemic heart disease. Of these, in developing countries rheumatic heart disease is the commonest type, whereas cardiomyopathies and congenital heart disease are more common in developed countries. Among all presentations of Rheumatic heart disease, mitral stenosis is the predominant lesion and accounts for nearly three quarters of all cases.

Cardiomyopathies are being increasingly recognized with three main types – the dilated (including peripartum cardiomyopathy), restrictive and hypertrophic variety. The overall incidence of heart disease in pregnancy is <1% [1]. The presence of maternal heart disease affects the fetus in a number of ways. The risk of spontaneous miscarriage and therapeutic abortion increases in women with heart disease[2]. The children born from the mother with congenital heart disease are at increased risk of congenital heart disease. The overall risk of inheriting polygenic cardiac disease is 3-5%, as compared to 1% risk in the general population [3]. This risk is dependent on the condition of affected parent and there is an increased risk if previous siblings are affected [4].

Some cardiac medications can have adverse effects on the fetus such as ACE inhibitors, warfarin and statins. ACE inhibitors are well known for the teratogenic effects especially during the first trimester and should therefore be avoided during this period [5]. Exposure during the second and third trimester can lead to marked fetal hypotension and decreased renal blood flow. If the use of ACE inhibitors is necessary, the lowest possible dose should be used and amniotic fluid levels and fetal growth should be monitored carefully. The use of Statins during pregnancy is controversial However, epidemiological data suggests that statins are not major teratogens. So, it is still advisable to avoid statins during the first trimester [6]**.** The relative immunocompromised state of

pregnancy increases the risk of infection (e.g. urinary tract infection). This can increase the heart rate, potentially worsening the cardiac function. Approximately, 1% of all pregnancies are complicated by cardiovascular diseases.

In developed countries, the prevalence of pregnancy complicated by rheumatic heart disease (RHD) has decreased. Previous ratio of 3:1 for RHD to congenital heart disease complicating pregnancy is now essentially reversed but in developing countries rheumatic heart diseases are still predominant and continues to be a major cause of maternal morbidity and mortality. In western countries, maternal heart diseases are the third most common cause of maternal death and complicates 1-3% of pregnancies [7.8] .

The circulatory changes of pregnancy in the presence of maternal heart disease may result in adverse consequences even the death of the mother or the fetus [9]. Pregnancy is a challenge to women with heart disease because of the 50% increase in plasma volume and six-fold increase in the risk of thrombosis[10]. In developing countries, a large number of women become pregnant prior to seeking therapeutic intervention for cardiac lesions and many of them are only diagnosed with heart disease during pregnancy [11]. Detailed assessment of patients throughout pregnancy may lead to initial discovery of heart disease. If diagnosed early, and managed properly with a multidisciplinary approach, collaboration of a team of trained obstetricians, cardiologist, anesthetist, pediatrician and nurse, it results in a successful outcome for mother and child in majority of cases [11].

In women with normal reserve, hemodynamic changes of normal pregnancy are well tolerated. However, decompensation occurs in diseased hearts, with resultant increase in maternal morbidity and mortality. It is natural to expect that the fetus will also be compromised in these mothers as fetal health depends upon adequate and continuous supply of well oxygenated maternal blood [7] .

Most data concerning pregnancy courses in heart disease patients are anecdotal reports or are in small series; only a few comprehensive studies are available. [41-46]. The primary objective of the present study is to assess the effect of heart disease in pregnancy and its outcome.

There are different criteria used for diagnosis which also change with time due to new investigation techniques[13]. The most dominant of rheumatic heart lesions has been mitral stenosis (up to 80%) followed by aortic stenosis (10%), mitral regurgitation (6.6%) and aortic regurgitation (2.5%)[14]. The ischemic heart disease in pregnancy is approximately 1 per 10000 deliveries and acute myocardial infarction is 7.5 per 10000 deliveries[16].

The improvements in cardiovascular surgery has improved the prognosis of congenital lesions and many women, even with severe defects, are reaching the child bearing age[15]. Challenges in the management have increased because successful treatment of congenital heart diseases has created a new population who are able to reach the child bearing age and pregnancy in older women who are susceptible to heart disease acquired in adulthood. The most common clinical features of

cardiac lesions like breathlessness, pedal edema, murmurs which mimic normal physiological changes in pregnancy pose a diagnostic difficulty for obstetricians. However, there is decreased incidence of cardiac disease in pregnancy due to improved facilities and surgical interventions early in childhood. The obstetric complications like pre-eclampsia, anemia, preterm labor, fetal growth restriction further worsen the outcome and complicate the management of pregnancy with cardiac disease. Pregnancy related complications that compound the heart disease are ignored in the rural setup and patients rarely seek proper early care.

AIMS AND OBJECTIVE

1. To study the incidence of patients with heart disease complicating pregnancy.

2. To study the outcome of pregnancy in patients with heart disease complicating pregnancy

3. To study the prevalence of antepartum, intrapartum and postpartum complications in patients with heart disease complicating pregnancy.

4. To analyze the impacts of heart disease on pregnancy.

5. To analyze the impacts of pregnancy on heart disease.

MATERIALS & METHODS

The present study was conducted in the Department of Obstetrics and gynecology at Yenepoya Medical College Hospital (Deemed to be University) Karnataka, India with the aim of examining the potential impact of maternal cardiac disorders on the maternal and fetal outcomes in pregnancies.

This facility serves as a referral center for the population in the city, peripheral and rural areas across the state and also the adjoining areas from the neighboring state. The study was carried out between August 2023 to August 2024. A total of 0.77% women with cardiac disease were included in the study.

Inclusion criteria

All pregnant women are already diagnosed with various cardiac diseases (rheumatic, congenital, valvular, ischemic, surgically corrected, cardiomyopathies) regardless of gestational age (antenatal, intrapartum, postpartum).

All pregnant patients irrespective of gestational age, either who were referred or attended OPD or casualty but who do not have diagnosed heart disease, but presenting with symptoms suggestive of cardiac disease.

Exclusion criteria

The study excludes pregnant patients with cardiac diseases who have medical comorbidities such as anemia, hypertensive disorder of pregnancy, gestational diabetes mellitus, renal disorder, sepsis,

pulmonary, endocrinological, hepatic disorders, multiple pregnancy, vesicular mole who could mimic heart disease or could affect the study.

Methodology

(i) All pregnant women who were referred or attended OPD but who do not have heart disease but presenting with symptoms and signs suggestive of heart disease were subjected to meticulous history taking, detailed clinical examination, investigation was done after getting informed consent. A structured detailed proforma was used to gather the essential information regarding the heart disease in pregnancy, baseline data was collected by recording the demographic data, age, parity, gestational age along with following details.

(ii) Meticulous proper history taking including previous significant history of Rheumatic Fever

(iii) History of decompensation in preceding pregnancies or present pregnancy

(iv) Details of the heart disease

(v) Details of medical and surgical treatment of Heart Disease formerly

(vi) A methodical clinical examination

(vii) Required investigations: ECG, ECHO Echocardiographic assessment of left and right ventricular systolic function to diagnose the organic lesion

(vii) Providing appropriate treatment

(viii) Cardiologist opinion on follow up

(ix) Appropriate counseling.

RESULTS

A total of 12 pregnant women with cardiac disease out of 1550 deliveries were included in the study. Incidence of the cardiac disease amongst pregnant women found in our hospital was 0.77%.

Table 1- Maternal characteristics of women with age wise distribution

Maternal age(in years)	Number	Percentage%
<20	1	8.33
20-25	3	25

26-30	5	41.66
31-35	2	16.66
>35	1	8.33

Out of 12 patients, the maximum number of patients were seen between 20-30 years of age; in 20-25 years 3 out of 12 (25%) and 26-30 years 5 out of 12 (41.66%).

Table 2-Parity wise distribution

Parity	Number	Percentage (%)
Primi	7	58.33
Gravida 2	3	25
Gravida 3 or more	2	16.66

Among the 12 pregnant women with cardiac disease 7 (58.33%) were primigravida, 3 out 12 (25%) were gravida 2, and 2 out 12 patients (.16.66%) were gravida 3 or more.

Table 3- Gestational age wise distribution

Gestational age	Number	Percentage (%)
<28 weeks	1	8.33
28-32 weeks	2	16.66

33-36 weeks	3	25
37-40 weeks	5	41.66
Intrapartum and postpartum	**1**	**8.33**

Out of 12 patients, 5 patients were term gestation (41.66%) and 6 patients were preterm (50%) and 1 patient (8.33%) referred to intrapartum.

Table 4- Incidence of type of heart disease

Type of CARDIAC DISEASE	Number	Percentage (%)
RHEUMATIC HEART DISEASE single valve	**3**	**25%**
multiple valve	**2**	**16.66%**
CONGENITAL HEART DISEASE	**3**	**25%**
MISCELLANEOUS (MVP,CARDIOMYOPATHY)	**3**	**25%**
POST CARDIAC SURGERY	**1**	**8.33%**

Most of the patients in the study had Rheumatic heart disease 5 out of 12 (41.66%) Mitral valve was the most common lesion and was seen in (25%), multiple valve diseases was seen in (16.6%) of cases. After RHD the next common lesion was Congenital Heart Disease 3 out of 12 (25%), followed by miscellaneous category (25%) which included MVP, Cardiomyopathy, Surgical correction prior to pregnancy was done in 1 patient (8.33%).

Table 5- NYHA grading-functional class of the disease.

NYHA Class	Number	Percentage (%)
Class 1	3	25%
Class 2	6	50%
Class 3	2	16.66%
Class 4	1	8.3%

Most of the patients belonged to class 2 NYHA (50%), (25%) of the patients belonged to class 1. It was seen that the outcome worsened as the class of disease increased from class 1/II to class III(16.66%) class IV (.8.33%)

Table 6-Mode Of delivery

Mode of delivery	**Number**	**Percentage (%)**
Vaginal	5	41.66
C-section	2	16.66
Instrumental deliveries	2	16.66
MTP	1	8.33
Maternal death	2	16.66

Most of the patients (41.66%) had vaginal deliveries, (16.66%) had instrumental vaginal deliveries to cut short the 2nd stage of labor. Out of 12, 2 patients (16.66.%) patients had C section and indications were fetal distress, CPD, failed induction, malpresentations, previous LSCS. Out of 12

pregnant women 1 patient (8.33%) had first trimester abortions and there were 2 (16.66%) maternal deaths.

Table 7-Maternal complications

Complications	**Number**	**Percentage (%)**
PRESENT	8	66.66%
ABSENT	4	33.33%
NON CARDIAC	2	16.66%
Anemia	1	8.33%
Pre eclampsia	1	8.33%
Abruptio placentae	0	0%
CARDIAC	6	50%
CCF	2	16.66%
Pulmonary edema	2	16.66%
Atrial fibrillation	1	8.33%
Pulmonary hypertension	1	8.33%

Maternal mortality	2	16.66%

Maternal complications were seen in (66.66%) of pregnant women. The common non cardiac complications noticed were anemia (8.33%), preeclampsia and eclampsia. (8.33%). Cardiac complications were seen in (50%) cases. The most common cardiac complications were CCF (16.66%) Pulmonary edema (16.66%), pulmonary hypertension (8.33%) and (8.33%) cases of Atrial fibrillation were noted.

Out of the 6 (50%) patients requiring ICU care, 4 (33.33%) patients recovered and there were 2 (16.66%) maternal deaths. Cause of the death was severe MS with Cardiac Failure and pulmonary edema.

Table 8-Neonatal Outcome

Complications	Number	Percentage (%)
Preterm births	3	25
NICU admission	5	41.66
IUGR	2	16.66
APGAR SCORE <7 at 1 minute	1	8.33
Neonatal deaths	1	8.33%

Table 8 shows the neonatal outcome in women with cardiac disease. Prematurity was seen in (25%) of the babies, (41.66%) babies required NICU care, (16.66%) had IUGR, APGAR score <7 at 1 minute was seen in (8.33%) and (8.33%) babies had neonatal death.

DISCUSSION

Heart disease is the leading non obstetric factor contributing to maternal morbidity and mortality. The impact on newborn outcomes is substantial. favorable outcomes are classified as NYHA class I and II who actively mitigate risk factors associated with heart failure including anemia, infections and arrhythmias. In addition they undergo routine cardiac monitoring and strict compliance with cardiac medications .Women with a severe form of cardiac diseases should refrain from pregnancy and in such cases, surgical intervention should be performed prior to conception.

Our tertiary center is a medical college hospital which serves as a referral unit for the population in the city, peripheral and rural areas across the state and also the adjoining areas of the neighboring state .

In our study the incidence of cardiac disease in pregnancy was 0.77%. The incidence of clinically significant cardiac disease in pregnancy varies from 0.1% to 4% with an average of 0.8% as quoted from various centres[12.].

Hink and Bolte reported that cardiac disease has a detrimental impact on approximately three percent of pregnancies. The outcome has a substantial impact on both the maternal figure and the offspring [18]. The study was conducted by HemaPriyaL etal. Examines the maternal and fetal outcomes of women who received treatment for heart disease at our hospital. The prevalence rate of heart disease among pregnant women who sought care at this clinic was determined to be 1.29%[17]. The study conducted by Sahni G et al revealed at frequency ranging from 0.3% to 3.5%.. Among the patients, four underwent MVA with check curettage [(19-22)].

In the current study ,majority of patients were in the age group of 20-30 yrs 8 of 12pts (66.66%), This was similar to the study done at Andhra Pradesh by NittaM etal where in the age group distribution that was most frequently observed was 26 to 30 yrs (N=69%),only 2% found under the age of 20.

The present study shows that RHD was the predominant lesion (41%) ,followed by CHD (25%),with one among 12 pregnancy was post cardiac surgery accounting to 8.33% and 3 out of 12 pregnancy(25%) were from the miscellaneous category which included MVP, cardiomyopathies. The observations in the present study were comparable to other studies done by Sheela et al (67%)[39] and Balasaheb Vetal (73.9%)[27,28].

In the current study RHD (41%) was the principal cardiac lesion and Mitral Valve was the most common Valve involved. The results were in consensus with Vidhyadhar et al ,Mazhar SB etal [31] Devabhaktula,N Bhatla et al [1].The current study indirectly indicates inadequate treatment of streptococcal infectious disease in childhood and adolescence. Echocardiography was done routinely in our patients, echocardiography was helpful for early and accurate evaluation of cardiac lesions.

In our study 57.66% females had spontaneous delivery as compared to 41% (Nilajkumar et al) [31], 24% (alireza et al)[35],73.5% (Hameed et al)[33], 62.8% (Vidhyadhar et al) in other studies. Cesarean section (16.66%) was done only for obstetrical indications. The indications included fetal distress, cpd, malpresentations, and failed induction. Nilajkumar et al [31] reported cesarean in (20.6%), (9.5%) by Mazhar et al [31] , 76% by Alireza et al[35].

In the present study 25% of women underwent labor induction as compared to 15% in study conducted by Hameed et al[33] and Prathiba D et al[48] In the evaluation of pregnancy with cardiac disease, 8.33% had inevitable abortions , and had to undergo MTP which was comparable to Suman et al[23] and Mazhar et al[31].

Mortality in pregnant women with congenital heart disease is mainly due to cardiac failure and pulmonary oedema. which was comparable to Hameed et al[33,]Mazher et al[31],Azheer et al [35,] Verena et al[37], Akhtar et al[38], and Sheetal CN et al[39].

In the present study, 3 out of 12 babies (25%) has preterm births, 5(41.66%) had NICU admission (16.66%), IUGR (8.33%), APGAR Score <7 at 1 minute and there was (8.33%) neonatal death. These results were comparable to Mazhar et al [31].

CONCLUSION

Present data supports the fact that the prognosis of pregnant women with heart disease has improved, leading frequently to successful outcomes. Proper evaluation of maternal prognosis prior to conception and adequate clinical follow up during pregnancy are both fundamental measures for obtaining a satisfactory outcome in these patients..This study concluded that pre-pregnancy diagnosis, counseling, appropriate referral, routine antenatal supervision and delivery at an equipped center improve the pregnancy with heart disease outcome for both mother and baby.

Cardiac failure is a serious complication and often leads to maternal death. We therefore stress the need to monitor cardiac patients for early detection and management of heart failure throughout the course of pregnancy, labor and puerperium.

It is advisable for pregnant women experiencing cardiac complications to arrange regular prenatal checkups. If deemed necessary, corrective procedures during pregnancy should be performed in the second trimester; nonetheless, it is important to note that there exists a significant danger to the fetus. Prior to conception, it is Imperative for the cardiologist to assess any cardiac drugs administered. Ideally, the process of childbirth should occur within a tertiary care facility that employs a multidisciplinary approach. Fetal echocardiography (ECHO) is performed at approximately 20 weeks of gestation to identify inherited heart abnormalities in neonates. Undoubtedly, implementing a uniform treatment approach and ensuring Widespread availability of obstetric and cardiac care will significantly improve the results for women suffering from heart disease.

From my study, the majority of pregnant mothers with heart disease complicating pregnancy had no specific complaints during their antenatal visits, hence all antenatal patients at any gestational age should undergo screening ECHO for early diagnosis of heart disease.

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