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Original Research Article

A study of maternal outcome in heart disease in pregnancy in a tertiary care centre

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ABSTRACT

Background: Cardiovascular disease in women is associated with 4% complications during pregnancy and is the most frequent leading cause of maternal mortality reaching up to 15%. It stands third among the most common causes of maternal mortality after obstetric haemorrhage and preeclampsia respectively. The objective of this study is to study the maternal outcome of heart disease in pregnancy.
Methods: An Observational study was conducted over a period of 8 months over 50 antenatal patients with heart disease from January 2020 to August 2020 in the department of obstetrics and gynaecology, grant government medical college and JJ group of hospitals, Mumbai with appropriate inclusion and exclusion criteria. Prevalence of congenital and acquired heart disease complicating pregnancy, complications, age wise and parity wise distribution were mainly studied.
Results: The incidence of heart disease was 1.8% amongst the 2,750 total deliveries conducted. In this study 46 (92%) were registered and 4 (8%) were unregistered antenatal cases. 45 (90%) belonged to upper lower class and lower class as per Kupuswamy scale with poor nutrition and antenatal care. 34 (68%) of patients had rheumatic heart disease and 11 (22%) patients had congenital heart disease. Mitral stenosis was found to be the dominant valvular lesion in rheumatic heart disease in 12 (24%) cases. Over 25 (50%) of the patients had normal vaginal delivery and 9 (18%) had instrumental vaginal deliveries, 7 (14%) with vacuum and 2 (4%) with forceps. Congestive cardiac failure was found to be the major complication found in 4 (3.9%) cases. About 8 (16%) patients required intensive care unit admission. Maternal maternity is about 4% (2 patients) in the present study.
Conclusions: Maternal mortality in heart disease patients can be brought down significantly by effective preconceptional counselling, and improvements in medical, surgical, antenatal, intranatal, and postnatal care and effective motivation for contraception.

Keywords: Rheumatic heart disease, Congenital heart disease, Complications, Cardiac failure, Outcome

INTRODUCTION

Cardiovascular disease in women is associated with 4% complications during pregnancy and is the most frequent leading cause of maternal mortality reaching up to 15%.[1-4] Rheumatic heart disease, congenital heart disease and previous endocarditis are the most common causes giving rise to clinically significant valvular heart disease among women of child bearing age.[5] However, in developing countries like India, though rheumatic heart disease has a declining trend, they account for the majority of the cardiovascular diseases in pregnancy (56%-89%). Whereas in the western world, congenital heart disease is most common (75%-82%) with shunt lesions

predominating in around 20%-65%. Cardiac disease may be clinically silent throughout pregnancy and manifest only at the time of delivery. Whereas asymptomatic patients with valvular regurgitation tend to tolerate volumetric overload during pregnancy, patients with mitral and aortic valve stenosis are at increased risk for the development of congestive heart disease and pulmonary oedema.[6] The prevalence of rheumatic heart disease continues to be high in developing and emerging countries where access to healthcare resources is limited. Numerous studies have reported a higher prevalence of rheumatic heart disease among women, attributed to their closer contact with children which consecutively subjects them to greater exposure to group A beta haemolytic streptococci.[7-10]

In a patient with heart disease who gets pregnant the already diseased heart worsens further due to the hemodynamic changes that are physiological during pregnancy which poses a great risk on the maternal and foetal health. A combination of the physiological and hormonal changes is hypothesized as contributing to certain decompensated states of pregnancy such as cardiomyopathy, congenital heart diseases and valvular disease. In cases of pregnancies complicated due to heart disease, maternal and foetal outcome depend on the type of disorder and the functional status of the patient. Maternal morbidity comprises of chances of arrhythmia, thromboembolism, cardiac failure, cardiogenic shock and even maternal mortality. This study has been done to study the prevalence of congenital and acquired heart disease in pregnant females, the complications and the overall outcome.

METHODS

Study design, location, duration and sample size

Current study was a retro prospective observational study conducted at department of obstetrics and gynaecology in an urban tertiary care centre, for a period of 2 years on 100 participants.

Research methodology and data collection

Written informed consent (in English/Hindi/Marathi) was taken from the subjects and/or their attendants before the recruitment of the subjects in the study. All the data collected was kept strictly confidential and used for the purpose of this study as described below. Any deviations from the below given methods/procedure was informed to and only after the IEC's approval any changes were made.

Subject population

Pregnant females who are a known case of heart disease or recently diagnosed with heart disease encountered during the period of study.

Inclusion criteria

Pregnant women with a history of or newly diagnosed cases of cardiac disease in the antennal period and pregnant women with heart disease giving consent to participate in the study were included

Exclusion criteria

Patients not giving consent to participate in the study and cases of heart disease diagnosed in the postpartum period were excluded.

Study procedure

The study will be carried out at a tertiary care hospital after obtaining informed consent to collect data. The patients who give consent will be interviewed followed by examination and information will be filled in the structured case record sheet. History of the patients admitted fulfilling the criteria will be taken followed by examination, complication, investigations, course in the hospital, treatment taken and the final outcome will be studied in detail and documented. The case record form contains: demographic details like patient's registration number, name initials, age, gender and socio-economic status, diagnosis, history, complications, investigations, treatment and treatment offered.

Data collection and statistical analysis

All the data collected from patient were compiled in a Microsoft office Excel sheet and will be analysed. Results were displayed in tabular and graphical format. Appropriate statistical test was applied wherever necessary.

RESULTS

Out of the total 2,750 deliveries conducted over a period of 8 months there were 50 confirmed cases of heart disease in the present study with an incidence of 1.8%.

Table 1: Age distribution.

Age (years)	N	%
<20	03	6
21-30	26	52
31-40	18	36
>40	02	4
Total	50	

Majority of the heart disease patients about 46 (92%) were registered at our hospital whereas only 4 (8%) were unregistered. The above table represents the age wise distribution of heart disease in pregnancy where majority of the patients lie in the range of 21-30 years accounting to 26 cases (52%). About 18 patients (36%) were in 31-40 years of age group. 3 (6%) of the patients belonged to

the < 20 years of age group and 2 patients (10%) were above 40 years of age.

Table 2: Distribution according to socioeconomic status (as per Kupuswamy scale).

Socioeconomic status	N	%
Lower middle class	05	10
Upper lower class	25	50
Lower class	20	40
Total	50	

Table 3: Gravida wise distribution.

Gravida score	N	%
Primigravida	18	36
2nd gravida	15	30
3rd gravida	12	24
>3rd gravida	5	10
Total	50	

Table 4: Type of heart disease.

Type of heart disease	N	%
Rheumatic heart disease	34	68
Mitral stenosis (MS)	12	24
Mitral regurgitation (MR)	7	14
MS+MR	6	12
Aortic regurgitation	1	2
MS + pulmonary artery hypertension (PAH)	4	8
MS + MR + PAH	4	8
Congenital heart disease	11	22
Atrial septal defect (ASD)	2	4
Ventricular septal defect (VSD)	3	6
ASD + PAH	2	4
VSD + PAH	1	2
VSD with Eisenmenger's syndrome	1	2
Patent ductus arteriosus (PDA)	1	2
Mitral valve prolapse	1	2
Others	5	10
Pericarditis	1	2
Myocarditis	1	2
Supraventricular tachycardia	1	2
Peripartum cardiomyopathy	2	4

Majority of the patients belonged to upper lower class as per Kupuswamy scale which was 25 patients (50%). 20 (40%) of the patients belonged to lower class and 5 (10%) of the mothers belonged to lower middle class. Rheumatic heart disease was commonly seen in these patients owing to their poor nutrition and hygiene. Total 18 patients (33.3%) which is the majority of the patients were primigravida and 15 (30%) were 2nd gravida. 12 (24%) were third gravida and 5 (10%) were more than 3rd gravida. Since pregnancy is usually discouraged in the patients with heart disease only 10% women were >3rd gravida. Preconceptional counselling and family planning paly a major role in these females with cardiac diseases.

The distribution of various heart diseases encountered during the study is depicted in results.

Table 5: New York heart association functional classification.

NYHA Class	N	%
Class 01	18	36
Class 02	28	56
Class 03	02	4
Class 04	02	4
Total	50	

Table 6: Mode of delivery.

Mode of delivery	N	%
Lower segment cesarean section	16	32
Vaginal	25	50
Instrumental delivery	09	18
Forceps delivery	02	4
Vacuum delivery	07	14

Table 7: Maternal complications.

Complications of heart disease	N	%
Atrial fibrillation	01	2
Congestive heart failure	03	6
Pulmonary oedema	01	2
Supraventricular Tachycardia	01	2
Nil	45	90
Total	50	

Rheumatic heart disease accounts for the majority of the cases with 34 (68%) of the total heart diseases. Mitral valve stenosis was the most common lesion observed in the patients of rheumatic heart disease followed by mitral regurgitation. The second most common heart disease were the congenital heart diseases with 11 (22%) patients. The commonly encountered lesions were atrial septal defect and ventricular septal defect. We came across one case of Eisenmenger's syndrome who had mortality. Other than these there was each case of percarditis, myocarditis and supraventricular tachycardia. There were 2 cases of peripartum cardiomyopathy. Majority of the patients (94%) were already diagnosed cases of heart disease except for 3 cases. NYHA functional classification is mentioned in results. 28 (56%) of cases belonged to Class 2 being the maximum. 18 (36%) of cases belonged to Class 1, 2 cases (4%) each to class 3 and class 4. As compared to the patients who belonged to class 3 and class 4 those who belonged to class 1 and class 2 had better prognosis and lesser complications. According to study results 25 (50%) of the patient had normal vaginal delivery. 16 (32%) underwent lower segment cesarean section which were mainly done for foetali indication. 7 (14%) of the patients had vaginal vacuum deliveries and 2 (4%) had vaginal forceps delivery. Thus, total instrumental deliveries were 9 (18%) which were mainly opted for to cut short second

stage of labour. The maternal complications encountered is depicted in study results. Maximum number of the patients had no complications which is about 45 (90%) and had a favorable outcome. Congestive heart failure was seen in 2 (4%) of the total cases out which 2 cases were of rheumatic heart disease with sever mitral stenosis and one with Eisenmenger's syndrome. 1 (0.9%) case each of pulmonary edema, atrial fibrillation and supraventricular tachycardia was seen accounting for up to 2% each all of which had rheumatic heart disease. About 8 patients (16%) required admission in the intensive care unit for close monitoring. Two maternal deaths were witnessed during this study one of which was a case of rheumatic heart disease with severe mitral stenosis with mitral regurgitation with pulmonary artery hypertension and one with ventricular septal defect with Eisenmenger's syndrome. Both the patients succumbed to uncompensated congestive heart failure.

DISCUSSION

As per this study, the incidence of cardiac disease among pregnant women is found to be 1.8%. This has been compared to various studies on heart disease in pregnancy in the past.

Table 8: Comparison of published reports with present study for incidence of mitral stenosis.

Study	Year	Incidence of mitral stenosis (%)
Shawney et al[16]	2003	89.3
Bhatla et al[17]	2003	34.2
Present study	2021	52

Table 9: Comparison of published reports with present study for rate of incidence.

Study	Year	Incidence (%)
Mudaliar and Menon[11]	1972	0.97
Chia[12]	1998	0.7
De Swiet and Fiddle[13]	1999	0.5
Williams[14]	2001	1
Present Study	2021	1.8

Table 10: Comparison of published reports with present study.

Study	NYHA I AND II (%)	NYHA III AND IV (%)
Shawney et al[16]	77.4	22.6
Bhatla et al[17]	84.5	15.5
Present study	92	8

The incidence seems to have increased because of better diagnostic tests and awareness amongst the people. Socioeconomic status has a major role to play in the disease progression and over all maternal outcome in these patients. In the present study, 90% of the total pregnant females with heart disease belonged to socioeconomic upper lower class and lower class according to Kuppuswamy's scale. A study conducted by Beebi et al in 1985 reported that 92% of their patients were from upper lower class and lower class.[15]

Table 11: Comparison of published reports with present study for maternal mortality.

Author	Year	Maternal mortality (%)
Jacob et al[18]	1999	15
De Swiet et al[13]	2000	3.8
Present study	2020	4

These patients with low socioeconomic status are more prone to co morbidities like anaemia, heart failure and infections which may have adverse effects on both maternal and foetal outcome. Also, these patients have poor nutrition which can lead to less weight gain and antenatal care is usually neglected because of their unawareness. Aggravation of rheumatic heart disease is due to the progressive nature of the lesion with age rather than parity as stated by Mudaliar and Menon in 1978. In the present study majority of the patients belonged to 21-30 years which was about 52%. The incidence of rheumatic heart disease among the pregnant females in the studies conducted by Mudaliar and Menon in 1972 and Sidkar in 1980 was found to be 90-96%. However, the studies conducted in western countries by Tan and De Swiet in 1988 stated the incidence of rheumatic heart disease to be 12% only. This shows that rheumatic heart disease is more of a concern in developing countries than in developed countries. A study published by Chia in 1998 concluded the incidence of rheumatic heart disease in their stud to be 61.6% and incidence of congenital heart disease to be 38.4%. When compared to our study the incidence of rheumatic heart disease was found to be 68% and incidence of congenital heart disease was 22%. In Rheumatic heart disease mitral stenosis is found to be the most dominant lesion. Sawhney et al concluded that mitral stenosis was the most predominant lesion (89.2%) amongst the 486 patients included in the study.[16] The incidence of mitral stenosis was found to be 34.2% in a study conducted by Bhatla et al in 2003.[17] In present study the incidence of mitral stenosis was found to be 52%. The second most common lesion found in rheumatic heart disease in our study is mitral regurgitation with incidence of 34%. In our study only 8% of the patients belonged to NYHA class III and IV who did not have a favourable outcome. In the study conducted by Shawney et al 2003, 77.4% of the patients belonged to NYHA I and II whereas 22.6% belonged to NYHA III and IV. Bhatla et al in 2003 reported 84.5% patient in NYHA I and II and 15.5% in NYHA III and IV. In the present study maternal complications in pregnant females with heart disease in pregnancy were seen in 10%. When compared to Bhatla et al it was 29.9%. In our study congestive cardiac failure as a complication was seen in 4% cases and both these cases had maternal mortality.[17] Atrial fibrillation was seen in 2% of the cases.16% required admission in critical care

unit for strict monitoring. We report 2 cases of maternal mortality in our study. 1 of which had rheumatic heart disease and 1 case of Eisenmenger's syndrome. The one with rheumatic heart disease belonged to class III and the one with Eisenmenger's syndrome belonged to class IV of NYHA functional classification. The results are compared to other studies as follows. Maternal mortality was reported by Jacob et al it 15% in 1999 and De Swiet et al reported it to be 3.8%.[18] In present study it was found to be 2.94%. Though maternal mortality in relation to heart disease in pregnancy has declined over the past 2 decades it still continues to be an important cause of heart disease in pregnancy. This decline is attributed to improved antenatal care, prompt diagnosis and treatment.

Limitations

Limitation of current study was heart disease diagnosed in the postpartum period were not a part of this study.

CONCLUSION

The medical, surgical and obstetrical care of a pregnant female with cardiac disease patient is considerably a tough task. The prognosis of the patient depends on their age, parity and socioeconomic status, functional cardiac capacity, other associated co morbidities, quality of medical, surgical and obstetrical care provided. Early termination of pregnancy and use of permanent sterilization methods improve the survival of women with high-risk cardiac disease. Once the pregnant patient seeks medical care, risk stratification is achieved and pregnancy is continued in low-risk group and the patients in high-risk group are counselled for termination if necessary. Once pregnancy is confirmed, a multi-disciplinary approach with a team of obstetrician, cardiologist, cardiothoracic surgeon, anaesthetist, good nursing care and social care provides the good chance to carry the pregnancy to a successful outcome.

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