ORIGINAL RESEARCH

A Cross-Sectional Study to Assess the Sociodemographic Characteristics and Early Pregnancy Behaviors among Pregnant Women with Heart Disease

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ABSTRACT

Background: Cardiac diseases complicate about 1% of pregnancies in women. Pregnancy is a natural stress test and the cardiovascular system must undergo major changes to its structure to sustain tremendous increases in blood volume. According to the National Centre for Health Statistics, almost half of adults aged 20 and older have at least one risk factor for cardiovascular disease. Detailed assessment of patient throughout pregnancy may lead to initial discovery of heart diseases. Hence, the present study was conducted at Tertiary Care Hospital to study the prevalence of heart diseases in pregnancy, and is to assess the Sociodemographic Characteristics and Early Pregnancy Behaviors among Pregnant Women with Heart Disease.

Materials and Methods: This prospective, hospital-based study was done in the Department of Obstetrics and Gynecology of a Teaching Institute of Goa from the 1st of June 2012 to 31st of May 2014 and included all the pregnant women or puerperia with heart disease who delivered during that time period. A written consent was obtained from all participants and they were fully informed about the study. Clinical history was gathered after admission, and patient-specific and pertinent information was acquired through interviews in a structured data collection schedule. In addition to all routine antenatal investigations, electrocardiography and echocardiography were performed. Collected data was tabulated on a Microsoft Excel sheet and analyzed using simple descriptive statistics like percentage, ratio and proportion.

Results: Out of total 10230 admissions in our hospital in year, 102 of women had pregnancy complicated by diagnosed heart diseases (1.0%). In present study, most of patients were having NYHA grade of 1 (67.6%) and 2 (26.5%). Two fifth of patients (21.6%) were illiterate. Most of admitted patients were from rural area (67.6%). One third of patients were having SES of class III (30.4%). In present study, 85.3% of subjects have registered for the ANC care. Only one third of subjects had four or more ANC visits (29.4%). Smoking and alcohol consumption during pregnancy was noticed in 2.9% and 6.9% of patients. In our study out of 102 patients, there was one maternal death in this study.

Conclusion: The incidence of heart disease in pregnancy was 1 % and most of the cases were NYHA Grade 1 (67.6%) or grade II (26.5%). Most of admitted patients were from rural area (67.6%). Only one third of subjects had four or more ANC visits (29.4%). Therefore, educating the patient about heart disease and its complications reduces maternal and perinatal mortality.

Keywords: Sociodemographic, Behaviors, Pregnant women, Heart Disease, Mitral stenosis.

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INTRODUCTION

Cardiac diseases complicate about 1% of pregnancies in women.[1]Cardiac diseases in pregnancy are broadly divided into congenital (CHD), and acquired. The proportion of women of child-bearing age with CHD, surgically treated has increased substantially in recent decades due to improved surgical and cardiac care. In developing countries, RHD is the commonest type. Among all presentations of Rheumatic heart disease (RHD), Mitral Stenosis (MS) is the predominant lesion accounting for nearly 3 quarters of all cases.

Pregnancy is a natural stress test and the cardiovascular system must undergo major changes to its structure to sustain tremendous increases in blood volume. So, it is critical to identify the risk factors beforehand, so that a woman's care can be properly managed throughout the pregnancy and a detailed delivery plan can be developed through shared decision making between the patient and provider. Moreover, we must think of heart disease as a possibility in every pregnant or postpartum patient we see to detect and treat at-risk mothers.

The presence of maternal heart diseases effects on the foetus in many numbers of ways. The risk of spontaneous miscarriages and therapeutic abortions increases in women with heart diseases. Women with cardiovascular disease should be advised that pregnancy can contribute to a decline in cardiac status, risk of maternal mortality or morbidity, and foetal risks such as preterm birth. Caesarean delivery is usually limited to obstetrical indications, and considerations are given for the specific cardiac lesions like Aortic dissection, Marfan's syndrome with dilated aortic root, overall maternal condition, and availability of experienced anaesthesia personnel and hospital capabilities. Forceps or vacuum extraction to cut short the second stage of labour to shorten and ease delivery, patients at intermediate or high risk may require monitoring for at least 72 hours postpartum.[2]

Cardiovascular abnormalities are considered most important non obstetric cause of morbidity and are a prominent reason for obstetrical intensive care unit admissions.[3] The circulatory changes of pregnancy in the presence of maternal heart diseases may result in adverse consequences even death of mother or foetus. Pregnancy is a challenge to women with heart diseases because of 50% increase in plasma volume and 6-fold increase in risk of thrombosis.[4] Importantly, cardiac output increases approximately 40 percent during pregnancy. Almost half of this total takes place by 8 weeks' gestation and is maximal by midpregnancy.[5]

According to the National Centre for Health Statistics, almost half of adults aged 20 and older have at least one risk factor for cardiovascular disease. The rising prevalence of cardiovascular diseases complicating pregnancy is likely multifactorial and includes the higher rates of obesity, hypertension, and diabetes.[6]Problems should be identified early and treated aggressively, especially pregnancy induced hypertension, hyperthyroidism, infection, and anaemia. In developing countries, a large number of women become pregnant prior of seeking therapeutic intervention for cardiac lesions and many of them are only diagnosed with heart diseases during pregnancy.[7,8]

Detailed assessment of patient throughout pregnancy may lead to initial discovery of heart diseases. A pregnancy heart team should conduct ongoing evaluation of all pregnant and postpartum women with known or suspected cardiovascular disease. The pregnancy heart team should have a comprehensive plan established for the pregnancy, delivery, and postpartum period. The plan should include the review of cardiac medication safety for the mother and the fetus, and the risk to the fetus from congenital and genetic conditions. Identification of the behavioral risk factors of CVDs among pregnant women is an important

global public health issue, but very limited studies have sought to identify behavioral risk factors of CVDs in pregnant women. Hence, the present study was conducted at Tertiary Care Hospital to study the prevalence of heart diseases in pregnancy, and is to assess the Sociodemographic Characteristics and Early Pregnancy Behaviors among Pregnant Women with Heart Disease.

MATERIALS & METHODS
Study Design and Subjects
This prospective, hospital based, descriptive study was done in the Department of Obstetrics and Gynecology of a Teaching Institute of Goa from the 1st of June 2012 to 31st of May 2014. We included all the pregnant women or puerperia with heart disease who delivered during that time period. The inclusion criteria were all pregnant women admitted in the antenatal wards with associated heart disease and further confirmed by diagnostic tests, known case of heart disease during routine antenatal checkup, previously diagnosed with heart disease who are treated either medically or surgically, and chronic. Outpatient department patients were not included, unless admitted to the wards, due to fear of losing them to follow up.

Data Collection and Investigations
A written consent was obtained from all participants and they were fully informed about the study.

Clinical history was gathered after admission, and patient-specific and pertinent information was acquired through interviews in a structured data collection schedule which included sociodemographic characteristics and early pregnancy behaviors characteristics.

In addition to all routine antenatal investigations, electrocardiography and echocardiography were performed. Fetal echo was advised to all patients with CHD. Patients were classified into a functional grade according to the NYHA classification. At every visit to the OPD, besides providing ante natal care, each patient was asked about change in grade of breathlessness and examined carefully. In case of worsening of NYHA grade or at term, patients were admitted to the ward. Evaluation and management were done in consultation with cardiology. All deliveries were attended by a pediatrician and APGAR scoring assigned. Any complication during the antenatal or postnatal period was duly detected and managed in consultation with physicians and anesthesiologists.

Statistical Analysis
Collected data was tabulated on a Microsoft Excel sheet and analyzed using simple descriptive statistics like percentage, ratio and proportion. Institutional ethics committee approval was taken prior to embarking on this study. There was no conflict of interest. Confidentiality related to identity of the participants was maintained.

RESULTS
Out of total 10230 admissions in our hospital in year, 102 of women had pregnancy complicated by diagnosed heart diseases (1.0%). In present study (Table 1), the patients included in the study group were categorized based on their symptoms into NYHA classification and it was observed that most of patients were having NYH grade of 1 (67.6%) and 2 (26.5%).

Table 1: Distribution heart disease according to NYHA Grading among study participants (N=102)

NYHA Grade	Number	%
1	69	67.6
2	27	26.5

3	4	3.9
4	2	2.0

In present study (Table 2) the 75.5% of patients were from 20-30 years of age group. Two fifth of patients (21.6%) were illiterate. Most of admitted patients were from rural area (67.6%). 38.2% of patients were residing in the extended families. One third of patients were having SES of class III (30.4%). Around one tenth of patients were having 4 or more children (9.8%).

Table 2: Sociodemographic characteristics of the study participants (N=102).

Variables	Number	%
Age group (in years)		
<20	7	6.9
20-30	77	75.5
<30	18	17.6
Education		
Illiterate	22	21.6
Primary or middle school	43	42.2
High school or senior secondary	21	20.6
Graduate or Diploma or Above	16	15.7
Residence		
Rural	69	67.6
Urban	33	32.4
Religion		
Hindu	22	21.6
Muslim	13	12.7
Christian	67	65.7
Type of Family		
Nuclear	31	30.4
Joint	32	31.4
Extended	39	38.2
Socioeconomic status*		
Class I	11	10.8
Class II	28	27.5
Class III	31	30.4
Class IV	20	19.6
Class V	12	11.8
Marital Status		
Single	7	6.9
Married	76	74.5
Widowed	9	8.8
Separated	11	10.8
Number of children		
Less 2 children	42	41.2
2-3 children	50	49.0
4 or more children	10	9.8

*Modified B.G Prasad SES Classification

In present study (Table 3), 85.3% of subjects have registered for the ANC care. Out of those registered for ANC care, the gestational age at booking was 20-30 years for 70.6% of patients. Only one third of subjects had four or more ANC visits (29.4%). 2% of patients gave family history of CHD or congenital abnormalities and syndromes. Smoking and alcohol consumption during pregnancy was noticed in 2.9% and 6.9% of patients. 6.9% of patients were obese as per BMI standards. 30.4% of patients said that current pregnancy is unplanned pregnancy. 66.7% of patients reported self-reported usage of medication. IFA intake was reported in 55.9% of patients and 13.7% gave history of previous miscarriage or termination of pregnancy. In our study out of 102 patients, there was one maternal death in this study. This was seen in an 18-year-old girl who presented with an uncorrected ASD.

Table 3: Early Pregnancy Behaviors of the study participants (N=102)

Variables	Number	%
Booked for ANC care		
Yes	87	85.3
No	15	14.7
Gestational age at booking (in years)	(n=87)	
<20	4	3.9
20-30	72	70.6
<30	11	10.8
Number of ANC visits		
Nil	27	26.5
1	11	10.8
2-3	34	33.3
4 or more	30	29.4
Family history of CHD or congenital abnormalities and syndromes		
Yes	2	2.0
No	100	98.0
Smoking in pregnancy		
Yes	3	2.9
No	99	97.1
Alcohol consumption		
Yes	7	6.9
No	95	93.1
Woman's BMI (kg/m^2)		
<18.5	18	17.6
18.5-24.9	59	57.8
25.0-29.9	18	17.6
30 or more	7	6.9
Unplanned pregnancy		
Yes	31	30.4
No	71	69.6
Woman's self-reported usage of medication		
Yes	68	66.7
No	34	33.3
IFA intake		
Yes	57	55.9

No	45	44.1
History of previous miscarriage or termination of pregnancy*		
Yes	14	13.7
No	88	86.3

*N=97

DISCUSSION

Reducing maternal mortality is a World Health Organization (WHO) global health goal. Although maternal deaths due to haemorrhage and infection are declining, those related to heart disease are increasing and are now the most important. This study was conducted at department of obstetrics and gynaecology, government general hospital Goa in a total of 102 women a tertiary centre. This study aimed at assessment of maternal and neonatal complications associated with cardiac diseases in pregnancy. In the present study, the prevalence of 1.0%, comparable to 1% in Bhatla et al.,[1] differs from the 4.5% in a study conducted by Puri et al.,[9]. In the current study majority of the patients were in the age group of 20-30 years (65%) and most of them are second gravidae. In Vidyadhare et al., study, 70% were either primigravida or primipara.[10] In an analysis of maternal mortality in the United States between 2011 and 2013, the causes previously responsible for most maternal deaths-haemorrhage, hypertensive disorders, and Embolism continued to show declining rates. In contrast, deaths attributable to cardiovascular diseases were responsible for approximately 26 percent of all pregnancy-related deaths.

In the present study, 94.1% of cases were in the NYHA I-II grade. Of these, 67.6% were grade I and 26.5% were grade II. The remaining 5.9% cases were in grade III to IV. Sen et al., in their study of heart disease complicating pregnancy, observed 72.5% of cases in NYHA grade I to II and 26.5% cases in grade III to IV.[11] In another study by Koregol et al., 85.6% cases were in NYHA grade I to II and the remaining 14.4% cases were in grade III to IV.[12] In the present study, the percentage of NYHA grade I to II cases was higher than cases in grade III to IV as compared to the findings of Sen et al., and Koregol et al., due to timely surgical and medical intervention, as well as good medical and antenatal care available to them, thus keeping them in grade I to II of NYHA classification.[11,12]

Using the Registry of Pregnancy and Cardiac Disease, the maternal Mortality rate was 1.4 percent in women with a mechanical heart valve and 1.5 percent in women with a tissue heart valve. In the current study RHD (56.0%) was the principal cardiac lesion and mitral stenosis was the most common cardiac lesion. Rheumatic fever is uncommon in the United States because of less crowded living conditions, penicillin availability, and evolution of non rheumatogenic streptococcal strains. Still, it remains the chief cause of serious mitral valvular disease in women of childbearing age in the non-industrialized world Thus the current study indirectly indicates inadequate treatment of streptococcal infections in childhood and adolescence. Echocardiography was helpful for early and accurate evaluation of cardiac lesions. In general, vaginal delivery is preferred, and labour induction is usually safe.[13]

In present study the 75.5% of patients were from 20-30 years of age group. This observation is comparable to the findings reported by Puri et al.,.[9] One third of patients were having SES of class III (30.4%). The increased number of RHD cases in the class III group could be due to increased prevalence of RHD in the lower socio-economic strata. According to Davidson, rheumatic fever and its sequelae are seen in the lower socio-economic strata, while congenital heart disease is a disease associated with the upper socio-economic classes.[14] 41.2% of cases

in our study were primigravidas which is comparable to the observations of Devbhaktuni et al., who reported 40% of their cases to be primigravidas. 9.8% of women in our study were grand multiparas.[15] This was comparable to the study by Ashwini et al., who also observed 9% of their cases to be grand multiparas.[16]

Mortality in pregnant females with cardiac diseases is mainly due to cardiac failure and pulmonary oedema. Cardiovascular decompensation during labour may manifest as pulmonary oedema with hypoxia or as hypotension, or both. Fluid mobilized into the intravascular compartment and reduced peripheral vascular resistance place higher demands on myocardial performance. Therefore, meticulous care is continued into the puerperium. Postpartum haemorrhage, anaemia, infection, and thromboembolism are much more serious complications with heart disease, sepsis and severe preeclampsia cause or worsen pulmonary oedema because of endothelial activation and capillary-alveolar leakage. Pregnant women with Eisenmenger syndrome tolerate hypotension poorly, and death usually is caused by right ventricular failure with cardiogenic shock. Eisenmenger syndrome is considered to be an absolute contraindication to pregnancy.[14]

The rise we're seeing in maternal deaths is largely due to acquired cardiac disease in pregnancy. Most of these deaths are preventable, but we are missing opportunities to identify risk factors prior to pregnancy and there are often delays in recognizing symptoms during pregnancy and postpartum, particularly for black women. The new guidance clearly delineates between common signs and symptoms of normal pregnancy versus those that are abnormal and indicative of underlying cardiovascular disease. As clinicians, we need to be adept at distinguishing between the two if we're going to improve maternal outcomes.[14]

In developed countries infective Rheumatic lesions are decreased but still common in India where they can be worked out for pregnancy. But congenital, atherosclerotic, peripartum cardiomyopathies are on rise with improved diagnostic techniques. So pre pregnancy screening definitely improves foetomaternal outcome screening. Mortality in pregnant females with cardiac diseases is mainly due to cardiac failure and pulmonary oedema. In our study out of 102 patients, there was one maternal death in this study. This was seen in an 18-year-old girl who presented with an uncorrected ASD and which was comparable to the study done by Salam et al., and Kamat et al.[17,18] Both were of term gestation and one was delivered vaginally developed peripartum cardiomyopathy and the other a known case of congenital heart disease delivered through caesarean section.

CONCLUSION

The incidence of heart disease in pregnancy was 1 % and most of the cases were NYHA Grade 1 (67.6%) or grade II (26.5%). Two fifth of patients (21.6%) were illiterate. Most of admitted patients were from rural area (67.6%). In present study, 85.3% of subjects have registered for the ANC care. Only one third of subjects had four or more ANC visits (29.4%). Smoking and alcohol consumption during pregnancy was noticed in 2.9% and 6.9% of patients. In our study out of 102 patients, there was one maternal death in this study. So, easy access to good healthcare facilities plays an early role in the early detection and diagnosis of cardiac conditions. Therefore, educating the patient about heart disease and its complications reduces maternal and perinatal mortality. Further, maternal and perinatal morbidity and mortality can be reduced by proper antenatal care, adequate fetal surveillance and team management.

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