

Prevalence Study on Heart Diseases among Antenatal Mothers

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Abstract

Introduction: Heart diseases complicating pregnancy accounts for about 0.2-4% of pregnant women. The spectrum of cardiac disease in pregnancy is changing and differs between countries. In the Western world, congenital heart disease is the most frequent cardiovascular disease present during pregnancy (75-82%), with shunt lesions predominating (20-65%). Rheumatic valvular disease is most predominant heart disease in non-western countries like India, comprising 56-89% of all cardiovascular diseases in pregnancy. Cardiomyopathies are rare.

Aim: The aim of this study is to estimate the prevalence of heart diseases among antenatal mother and to improve the outcome of pregnancy by early intervention.

Materials and Methods: This was a prospective observational study conducted among 1000 antenatal mothers attending outpatient department in the Department of Cardiology at Madras Medical College between January and March 2015. Informed consent was obtained from each patient. The patients were screened in non-randomized fashion and were evaluated by echocardiographic examination (using PHILIPS machine HD 7X [model2011]).

Results: Out of 1000 cases screened, 557 were primigravida, 405 were second gravida, and 38 were third gravida. Among 47 cases of abnormal heart conditions, 26 (55%) were congenital heart disease, and 19 (41%) cases were rheumatic heart disease. There was no statistically significant correlation between age and type of heart disease. Mitral stenosis tops the list of heart diseases in this study followed by atrial septal defect (ASD). Cardiomyopathy (CMY) and coronary artery disease (CAD) were rare.

Conclusion: The prevalence of heart disease among pregnant population was 4.7%. The prevalence of congenital heart disease was 2.6%. ASD (ostium secundum type) was the most common heart disease among congenital heart diseases - 30%. Prevalence of rheumatic heart disease was 1.9%. Mitral stenosis was the most common among rheumatic heart diseases - 73%. Prevalence data were significantly different from western and non-western data. CMY and CADs were rare 0.01%.

Key words: Echocardiogram screening, Heart diseases and pregnancy, Prevalence

INTRODUCTION

Antenatal mothers are the special population in which physiological changes can affect or alter the cardiac function. Hemodynamic changes occur, especially, with

the second and third trimester and during and after delivery. Screening them for cardiac ailment is paramount importance so that they can be risk stratified, classified, and can have a better outcome and finally leading to reduction in maternal and infant mortality rate.

Careful history, physical examination, and non-invasive investigation such as electrocardiogram and transthoracic echocardiograms (ECHO) can diagnose heart diseases. Chest radiography, computerized tomography, and magnetic resonance imaging and radioisotope study will adversely affect the fetus, especially in the first trimester. Transesophageal ECHO is done only for cases of aortic

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Month of Submission : 06-2017
Month of Peer Review : 07-2017
Month of Acceptance : 08-2017
Month of Publishing : 08-2017

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dissection in pregnancy. Severity assessments and scoring system help them to anticipate and avoid complications. Necessary precautions can be taken like advising infective endocarditis prophylaxis. Other management issues are addressed if new cases are diagnosed at the time of screening. Pregnancy outcome will be better if they are diagnosed early if not before pregnancy.

It is estimated that 0.2-4% of pregnant women in developed countries have cardiovascular diseases.^{1,2} Maternal heart disease is now the major cause of maternal death during pregnancy.³ In South India, 30% of maternal death is due to hemorrhage, 17% due to sepsis, and 13% due to hypertensive heart disorders.⁴ Among heart diseases, congenital heart disease accounts to 75-82% of cardiovascular deaths with shunt lesions predominating up to 20-65%. Rheumatic heart diseases dominate in non-western countries (56-89%), followed by congenital heart diseases (9-19%).

Changes in the demographic pattern are another reason. Various antenatal health programs help them to be referred for suspicious murmurs during routine clinical examination. Mostly, 97% of them may be functional murmurs. Among the few patients diagnosed with cardiovascular disease, 3 out of 4 turn out to be new cases.⁵ In the United Kingdom, between 2006 and 2008, the rate of maternal mortality due to cardiac disease was 2.31 per 100,000 pregnancies. Therefore, cardiac disease is the most common cause of indirect maternal deaths.⁶

Predictors of maternal cardiovascular events are as follows:

1. Previous cardiac event
2. Baseline New York Heart Association (NYHA) Class II > or cyanosis
3. Mitral and aortic stenosis
4. Ejection fraction <40%
5. Mechanical prosthesis
6. Moderate-to-severe pulmonary hypertension
7. Dilated aorta >50 mm.

There is no prevalence data estimation of various diseases such as cardiomyopathies, coronary artery disease (CAD), and certain individual conditions among pregnant population. During pregnancy, a team approach is needed with consultations with obstetrician so that the mode, time, and place of delivery can be planned. For women with congenital heart disease, fetal ECHO is done at 22-26 weeks to screen them for congenital heart diseases.

Aims of Study

The aims of this study are as follows:

1. To screen antenatal mothers for cardiac diseases by transthoracic ECHO

2. To find out prevalence of cardiovascular disease among pregnant population
3. To classify the cardiac diseases complicating pregnancy
4. To separate high-risk cardiovascular conditions so that they can plan time, mode of delivery, and place of delivery
5. To assess the severity of stenotic lesions and advise them interventions if warranted before, during delivery, and after delivery
6. By finding new cases by ECHO, the management may differ infective endocarditis prophylaxis, anticoagulant management, and rheumatic fever prophylaxis can be advised on case basis
7. To study the change in demography and difference in prevalence by comparing with previously available data.

MATERIALS AND METHODS

All pregnant women referred to the cardiology outpatient department (OPD) were included; all ages and all gravida were included in non-randomized fashion. Prior consent was obtained before the study. The study was conducted from January 2015 to March 2015. A history of 4 cardinal symptoms was asked, physical examination done, and they underwent electrocardiogram and transthoracic ECHO.

Cardiac disease if diagnosed, they were subjected to detailed ECHO examination, and they were assessed for the severity of lesion and ventricular function assessed. Shunt if detected, the direction of shunt and presence or absence of pulmonary hypertension was noted. Focused ECHO examination was done for certain high-risk conditions. With the diagnosis, they were classified into four major group of heart diseases as congenital, rheumatic, cardiomyopathy (CMY), and CAD. Categorization was done according to the World Health Organization (WHO) classification, and they were referred back to obstetrician with appropriate advises regarding further management and follow-up.

Detailed transthoracic ECHO was performed using PHILIPS HD 7XE machine adult probe with 5 MHz for mother and pediatric probe with 8 MHz for fetal screening (only if mother has congenital heart disease). Structure and functional details such as chambers, valves, interatrial septum, interventricular septum, and other details are evaluated using two-dimensional, m-mode, 37 color-flow mapping, pulse-wave Doppler, continuous wave, and tissue dropper. ECHO dimensions referred with the ASE/ESC guidelines of ECHO.

Antenatal mothers with heart diseases both with and without a history of heart disease were taken into account,

and the prevalence was estimated for 1000 pregnant women. Individual conditions were subclassified into congenital, rheumatic, CMY, and CADs.

Inclusion Criteria

All pregnant women attending OPD who had been referred for cardiac evaluation as a routine irrespective of age, parity, and gestational age were included in the study.

Exclusion Criteria

- Cardiovascular diseases complicating pregnancy on admission.
- Rhythm disorders
- Hypertensive heart diseases
- NYHA Class IV
- Patients not willing to give consent.

OBSERVATION AND RESULTS

Out of screening of 1000 pregnant women, 129 cases (12.9%) were between 18 and 20 years, 508 cases (50.8%) were between ages 20 and 25 years, 301 were (30.1%) between 26 and 30 years, and 51 cases (5.1%) were between 31 and 35. There were 11 cases (1.1%) with age more than 35 years (Table 1).

Out of 1000 cases screened, 557 were primigravida, 405 were second gravida, and 38 were of third gravida. There was no gravida more than 3 in our observation (Table 2).

Among 1000 antenatal mothers screened, 953 were found to be normal. Among 47 cases of abnormal heart conditions, 26 were congenital heart disease, 19 cases were rheumatic heart disease, CAD was 1, and 1 case of CMY (Table 3).

Mitral stenosis tops the list of heart diseases among the 47 heart diseases followed by atrial septal defect (ASD), out of 1000 cases screened (Figure 1).

Newly diagnosed cases were 15 out of 26 congenital heart diseases (58%) and 9 out of 19 cases (47%). Among congenital heart diseases, 11 (42%) were old cases and 11 (58%) were new cases. Among rheumatic heart diseases, 10 (53%) were old cases and 9 (47%) were new cases (Table 4).

DISCUSSION

The prevalence of heart disease is available in various literatures for the general population. CAD is commonly seen problem in general population. However, in special population such as pregnant females, the prevalence of

Table 1: Age frequency

Age in years	Frequency (%)
18-20	129 (12.9)
21-25	508 (50.8)
26-30	301 (30.1)
31-35	51 (5.1)
Above 35	11 (1.1)
Total	1000 (100)

Table 2: Parity

Parity	Frequency (%)
Primi	557 (55.7)
Gravida 2	405 (40.5)
Gravida 3	38 (3.8)
Total	1000 (100.0)

Table 3: Type of heart disease distribution

Classification of heart disease	Frequency (%)
Normal	953 (95.3)
CHD	26 (2.6)
RHD	19 (1.9)
CAD	1 (0.1)
CMY	0 (0.1)
Total	1000 (100.0)

CHD: Coronary heart disease, CAD: Coronary artery disease, RHD: Rheumatic heart disease, CMY: Cardiomyopathy

Table 4: Old cases and new cases distribution

Category	Old (%)	New (%)	Total
CHD	11 (42)	15 (58)	26
RHD	10 (53)	9 (47)	19
CMY	1 (100)	0 (0)	1
CAD	1 (100)	0 (0)	1

CHD: Coronary heart disease, CAD: Coronary artery disease, RHD: Rheumatic heart disease, CMY: Cardiomyopathy

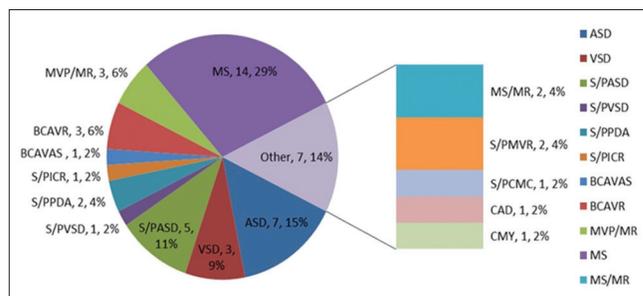


Figure 1: Types of heart disease among 47

heart disease is estimated to be between 0.2% and 4.0% in the western population.

Indian data are not available on the prevalence of heart disease among pregnant women. Among the investigations, to diagnose heart disease after electrocardiogram, ECHO

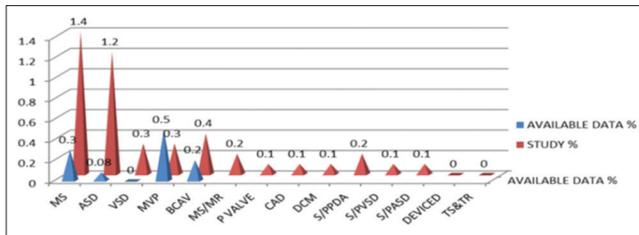


Figure 2: Comparison of study data with available data

remains to be an easy and inexpensive modality of choice even though it is not routinely offered for asymptomatic pregnant women. It is appropriate only in those who are known case of heart disease or in symptomatic patients or in patients referred by an obstetrician.

ECHO may show an increase in size throughout gestation; the right-sided chambers increase in size by 20% and the left atrium and left ventricle by 12% and 10%, respectively. At term, enlarged uterus may push structures leading to the appearance of posterior wall motion. There may be minimal pericardial fluid collection, and it is not pathological. Since pregnancy is a high-output state, the velocities across valves may be accentuated, and mild lesions may appear more than mild.

Prevalence is estimated for all heart diseases excluding hypertension, acute case, and rhythm disorders in the present study. We included bicuspid valve and mitral valve prolapse also in our study since they are associated with significant stenosis or regurgitation. According to available data, congenital heart diseases in general population is 19 per 100,000 including these two. If excluded, it is estimated as 8 per 1000 live births.

We have estimated in our study that 26 per 1000 pregnant women had congenital heart diseases and it accounts to about 55% of all heart diseases. In western data, it is 75-82% with shunt lesions predominating (20-65%).

Prevalence of heart disease among antenatal mothers is shown in Figure 2. There is a significant difference in the prevalence between the general population and pregnant population as for as congenital heart diseases are concerned. Among the congenital heart diseases, operated cases were estimated to be 35% (9/26).

Ostium secundum ASDs are the most common congenital heart disease which account to about 46% of congenital problems. Operated cases had average tricuspid regurgitation pressure gradient of 38 mm Hg. About 2% of congenital heart diseases are due to ventricular septal defects. There are no patent ductus arteriosus in our study. Ligated patent arteriosus cases in childhood are 2 in number (0.07%).

Mitral valve prolapse accounts to 5% of general population; in our study, it is 0.03%. This may be due to addition of those with significant regurgitation only and omission of those with only prolapse.

Double-chambered right ventricle and ventricular septal defect with pulmonary stenosis who underwent intracardiac repair at 12 years had residual pulmonary gradient of 30 mm of Hg. Such complex case accounts to 1 per 1000 pregnant (0.01%).

There were no cases of device closures for shunt lesions. This may be because of lack of availability and lack of knowledge about the procedure among the public.

Rheumatic heart disease was 19 per 1000 in our study, which accounts to 40% of total heart diseases. Among them, 14/1000 were due to mitral stenosis which accounts to 74% of rheumatic heart disease. There were no cases that underwent balloon mitral valvotomy. This may be due to the learning curve in the practice of cardiology. Closed mitral commissurotomy was done in 2010 in 1 case, and she had residual moderate mitral stenosis with a valve area of 1.4 cm².

Two cases with prosthetic valve were diagnosed, and they were labeled as high risk as per the WHO risk stratification. They were implanted with TTK Sri Chithra valve. The gradients were slightly higher than the post-operative value. There were no vegetations and pannus. There was no perivalvular and paravalvular leaks. They showed mild pulmonary hypertension.

Newly diagnosed cases were 15 out of 26 congenital heart diseases (58%) and 9 out of 19 cases (47%). This is high when compared to available data from other center who published in 2013,⁷ they were estimated it to be 30%. In some other study, it was mentioned as three-fourth of cases were newly diagnosed cases.

In western data, rheumatic heart disease is <10% among heart diseases in general population. In the western countries, it is estimated to be between 59% and 86% in the pregnant population. The prevalence in our study (40%) is lower than the non-western pregnant population. This may be due to development in the socioeconomic status and educational status and small family norm adopted by the society.

The median age among 1000 pregnant women screened was 23 years. This may be because of local custom to go for marriage at roughly around 21 years. There is no multigravida >3, an additional observation in our study which has some public health and social implication.

CONCLUSION

- Prevalence of heart disease among pregnant population is 4.7%
- Prevalence of congenital heart disease is 2.6%
- ASD ostium secundum type is the most common heart disease among congenital heart diseases - 30%
- Prevalence of rheumatic heart disease is 1.9%
- Mitral stenosis is the most common among rheumatic heart diseases - 73%
- Prevalence data are significantly different from western and non-western data
- CMY and CADs are rare 0.01%.

LIMITATION OF THIS STUDY

This study does not include acute cases, and the prevalence may be under estimated. In patients with heart disease, complicating pregnancy was not included. Both above can lead to under estimation. The prevalence in our study may imply urban population in the majority since our institution is a referral hospital. It may not be the distribution in general population. Patients were examined in non-randomized fashion.

ACKNOWLEDGMENT

A great many people made this work possible. My warmest respects and sincere gratitude to our beloved Prof. Dr. M S Ravi, Professor and Head of the Department of Cardiology, Government General Hospital, Chennai, who was the driving force behind this study. However, for his constant guidance, this study would not have been possible. I am indebted to Prof K Meenakshi, Prof. D Muthukumar, Prof.

N Swaminathan, Prof. G Ravishankar, and Prof. G Justin Paul, Dr. G S Sivakumar, Dr. T R Hemanth, Dr. R Ramesh, and Dr. S Sathish Kumar without whom much of this work would not have been possible. I acknowledge Dr. S Venkatesan and Dr. G Prathap Kumar, for the many useful comments made during this project. In addition, I am grateful to Dr. G Gnanavelu, Dr. G Palanisamy, Dr. Murthy, Dr. Arumugam, Dr. C Elangovan, Dr. Rajasekar Ramesh, Dr. S Murugan, Dr. G Manohar, Dr. S Saravanababu, Dr. B Balaji Pandian, Dr. C Elamaran, and Dr. Nageshwaran for their guidance. I also thank all my patients for their kind cooperation.

Finally, I thank all my professional colleagues for their support and valuable criticisms.

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How to cite this article: Selvarani G, Sivakumar GS, Swaminathan N, Ravishankar G, Paul GJ, Ramesh R, Hemanath TR, Kumar SS. Prevalence Study on Heart Diseases among Antenatal Mothers. *Int J Sci Stud* 2017;5(5):204-208.

Source of Support: Nil, **Conflict of Interest:** None declared.