A PROSPECTIVE OBSERVATIONAL STUDY ON CARDIOVASCULAR DISEASES AMONG PREGNANT LADIES USING ECHOCARDIOGRAPHY IN TERTIARY CARE CENTER IN KANYAKUMARI DISTRICT

Dissertation

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In partial fulfilment of the requirements for

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M.S. OBSTETRICS AND GYNAECOLOGY,

BRANCH VI

MAY 2022

CERTIFICATE

This is to certify that this dissertation entitled **"A Prospective Observational Study on Cardiovascular Diseases Among Pregnant Ladies Using Echocardiography in Tertiary Care Center in Kanyakumari District"** is a bonafide and genuine research work done by **Dr. Neha Haridas** under guidance and supervision in the Obstetrics and Gynaecology during the period of her postgraduate study for **M.S. Obstetrics and Gynaecology [Branch-VI]** from 2019-2022.

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DECLARATION

In the following pages is presented a consolidated report of the study **"A Prospective Observational Study on Cardiovascular Diseases Among Pregnant Ladies Using Echocardiography in Tertiary Care Center in Kanyakumari District"** is a bonafide and genuine research work carried out by me under the guidance of **Dr. Jesuthangam,** Professor, Department of Obstetrics and Gynecology, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Tamilnadu.

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Dr. Neha Haridas

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ABBREVIATIONS

RHD	-	Rheumatic Heart Disease
ACC	-	American College of Cardiology
AHA	-	American Heart Association
NYHA	-	New York Heart Association
ECG	-	Electrocardiography
LMWH	-	Low Molecular Weight Haparin
CHD	-	Congenital Heart Disease
ASD	-	Atrial Septal Defect
mWHO	-	Modified World Health Organisation Classification
CoA	-	Coarctation of Aorta
EVC	-	Ellis Van Creveld Syndrome
MVP	-	Mitral Valve Prolapse
LVEF	-	Left Ventricular Ejection Fraction
IUCD	-	Intra Uterine Contraceptive Device
MS	-	Mitral Stenosis
MR	-	Mitral Regurgitation
AS	-	Aortic Stenosis
AR	-	Aortic Regurgitation

Abstract

ABSTRACT

INTRODUCTION:

Echocardiography plays a very important investigation to diagnose and also follow up in a pregnant women with heart diseases, because it is noninvasive and does not expose the patients to radiation. Echocardiography provides information about disease etiology, leads to accurate assessment of disease severity and is a powerful means of monitoring progression.

AIMS AND OBJECTIVES:

- To screen antenatal mothers for cardiac disease by transthoracic ECHO
- To find out the prevalence of cardiovascular disease among pregnant ladies using echocardiogram
- To classify the cardiac diseases complicating pregnancy
- To know the mode of delivery among cardiovascular patients.

MATERIALS AND METHODS:

This a prosepective observational study conducted. Study was conducted from in Obstetrics and Gynaecology department, Sree Mookambika Institute of Medical Science Kulasekharam, who fulfill the inclusion and exclusion criteria. Total 70 women will be included in the study. A detailed history with thorough general physical examination will be done. All women will be subjected to routine antenatal tests and Electrocardiography and Echocardiography (ECHO). Based on the symptoms all the patients will be classified according to New NYHA functional classification. Patients will be advised to have regular antenatal check-up thereafter. The mode of delivery and complications will be documented.

RESULT:

70 patients were studied, among them 20 were diagnosed to have cardiac disease. Hence the prevalence of cardiac disease among the study population is 28.6%. The most common group of cardiac disease among pregnant females were rheumatic heart disease (65%). Most of them fall under NYHA Class-I(85%). 57% patients underwent normal vaginal delivery and 13%underwent lower segment c section.

CONCLUSION:

Occult Cardiac Diseases can be Picked up by Echocardiogram. In conclusion, Proper history, physical examinations with appropriate diagnostic test are essential for early diagnosis of the cardiac patient. Heart disease continues to be the major cause of maternal mortality and perinatal mortality. Hence in future maternal mortality in heart disease can be brought down significantly by proper counselling, improvement in medical, surgical, antenatal, intranatal, and postnatal care.

KEY WORDS: Newyork Heart Association (NYHA)

Introduction

Previously, the high maternal mortality in cardiac patients who became pregnant insisted that: Women with an abnormal heart should not become pregnant. This long-standing notion needs to be revised today.

Echocardiography plays a very important investigation to diagnose and also follow up in a pregnant women with heart diseases, because it is noninvasive and does not expose the patients to radiation.

Echocardiography used to determine the conditions under which women with heart disease can tolerate pregnancy and it helps in deciding the outcome of the pregnancy[1]. Echocardiography provides information about disease etiology, leads to accurate assessment of disease severity and is a powerful means of monitoring progression. Only with echocardiography it has been clearly demonstrated that during pregnancy congenital heart disease is the first leading abnormality followed by rheumatic heart disease. Accurate cardiac diagnosis leads to accurate estimation of prognosis and leads to determine whether surgical or medical intervention should be performed.[2]

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 countries like India, comprising 56-89% of all cardiovascular diseases in pregnancy. Cardiomyopathies are rare.[1]

The value of echocardiography to

1. Examine healthy pregnant women,
2. Determine the conditions under which women with heart disease can tolerate pregnancy

Cardiac disease in pregnancy should be given the utmost importance. Today patients with cardiac risk can be brought out safely without any risk to mother and fetus. Good antenatal care with obstetric, neonatologist, cardiologist and anesthesiologist i.e, a multidisciplinary combined approach can improve the outcome of the patient with the heart diseases.

Predictors of maternal cardiovascular events are as follows[1]

- Previous cardiac events
- Baseline New York heart association class>II or cynosis
- Mitral and aortic stenosis
- Ejection fraction <40%
- Mechanical prosthesis
- Moderate to severe pulmonary hypertension
- Dilated aorta >50mm

During pregnancy, a team approach is needed with consultation with obstetrican so that 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 disease.

Aims and Objectives

1. To screen antenatal mothers for cardiac disease by transthoracic ECHO
2. To find out the prevalence of cardiovascular disease among pregnant ladies using echocardiogram.
3. To classify the cardiac diseases complicating pregnancy
4. To know the mode of delivery among cardiovascular patients.

Hypothesis & Scientific Justification

Hypothesis:

There is correlation between cardiovascular diseases and pregnancy outcome.

Scientific justification of the study:

Pregnancy in women with heart disease increases the risk of maternal and fetal complications. Echocardiography provides information about disease etiology, leads to accurate assessment of disease severity and is a powerful means of monitoring progression. Accurate cardiac diagnosis leads to accurate estimation of prognosis and leads to determine whether surgical or medical intervention should be performed.[2] Therefore maternal mortality can be reduced by prior investigations.

Review of Literature

HISTORICAL REVIEW OF ECHOCARDIOGRAPHY:

The concept of "seeing" structures using "sound" dates back to the 1920s, when ultrasound produced by piezoelectric crystals was used to detect flaws in metals. In the early 1950s, Hertz and Edler described the use of ultrasound for assessing mitral-valve disease. Subsequently, Harvey Feigenbaum in the1960s standardized the clinical use of M-mode echocardiography for quantitative assessment of left-ventricular dimensions. The advent of 2-dimensional echocardiography (1970s), pulsed Doppler (1970s), and color Doppler (1980s) introduced new methods for routine assessment of cardiac anatomy and hemodynamics at bedside. Flexible scopes and superior transducers further paved the way to the application of transesophageal echocardiography. Tissue Doppler and contrast echocardiography recently have emerged as important tools for evaluation of regional myocardial function and blood flow. Miniaturization and the ability to pack thousands of crystals in an electronic array have transformed the application of 3-dimensional echocardiography into a bedside tomographic tool. At the current pace of development, echocardiography will be able to provide complete assessment of the heart in terms of its anatomy, coronary flow, and physiology. Training people and making it available at every bedside may be the only remaining challenges.[3]

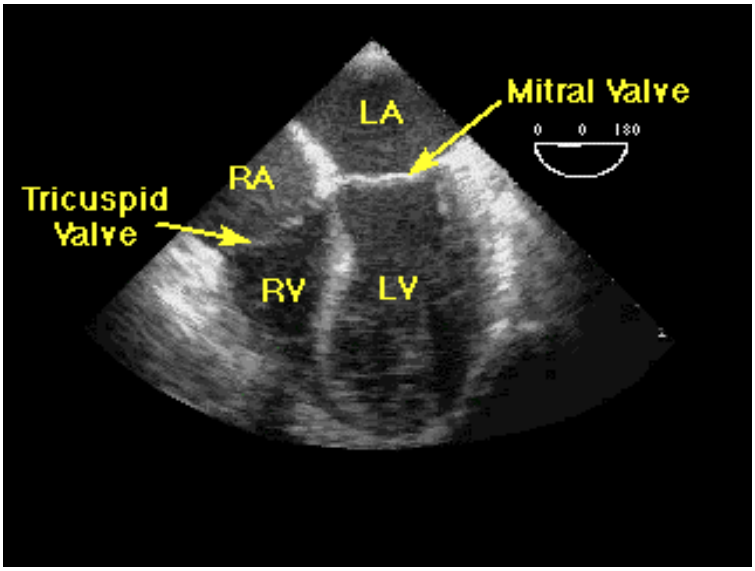


Fig. 1 Echocardiography

CARDIOVASCULAR CHANGES THAT MIMIC HEART DISEASE INCLUDE:

SYMPTOMS AND SIGNS: -

- Breathlessness
- Palpitation
- Fatigue
- Pedal edema

ANATOMICAL CHANGES:

- Displacement of the heart to the left
- Apex beat shifted upwards and laterally
- Physiological third heart sound
- Functional systolic murmur
- Internal mammary venous hum

ECG CHANGES:

- Left axis deviation,
- ST depression/ non specific ST-T changes

CHEST X RAY:

- Apparent increase in cardiac size Straightening of left heart border.

SYMPTOMS AND SIGNS SUGGESTIVE OF CARDIAC DISEASE:

SYMPTOMS:

- Dyspnea on mild activity
- Dyspnea at rest or orthopnea
- Paroxysmal nocturnal dyspnea
- Hemoptysis
- Chest pain
- Pedal edema till knees

SIGNS:

- Cyanosis
- Edema not subsiding with overnight rest
- Grade III or IV systolic murmurs
- Murmurs associated with thrill
- Diastolic murmurs
- Signs of congestive cardiac failure
- Signs of pulmonary edema
- Arrthymias

DIAGNOSIS OF HEART DISEASE IN PREGNANCY:

DIAGNOSTIC EVALUATION OF CARDIAC DISEASE:

HISTORY:

- Symptoms of heart disease from childhood
- History of rheumatic fever

SYMPTOMS AND SIGNS:

- Dyspnea at rest/ orthopnea / hemoptysis
- Murmurs
- Signs of congestive cardiac failure
- Arrthymias

FURTHER EVALUATION:

- ECG
- Chest Xray after shielding abdomen
- Echocardiography to screen valvular heart disease, congenital heart disease and cardiomyopathy
- Cardiac catheterization

CLINICAL CLASSIFICATION

Classification of the functional capacity recommended by the New York Heart Association (used for classification of dyspnoea due to heart failure)

Class I : No symptoms and no limitation in ordinary physical activity, e.g. shortness of breath when walking, climbing stairs etc.

Class II : Mild symptoms (mild shortness of breath and/or angina) and slight limitation during ordinary activity.

Class III : Marked limitation in activity due to symptoms, even during less-than-ordinary activity, **e.g.** walking short distances (20-100 m). Comfortable only at rest.

Class IV : Severe limitations. Experiences symptoms even while at rest. Mostly bedbound patients.

The NYHA system poorly discriminates Heart Failure patients across the spectrum of functional impairment. These findings raise important questions about the need for improved phenotyping of these patients to facilitate risk stratification and response to interventions.[10]

THE AMERICAN COLLEGE OF CARDIOLOGY/ AMERICAN HEART ASSOCIATION (ACC/AHA) STAGING SYSTEM DEFINES FOUR STAGES

ACC/AHA Classification of Heart Failure

Early-Stage Heart Failure

Stage A

At risk for developing heart failure without evidence of heart dysfunction.

Stage B

Evidence of heart dysfunction without symptoms.

Advanced-Stage Heart Failure

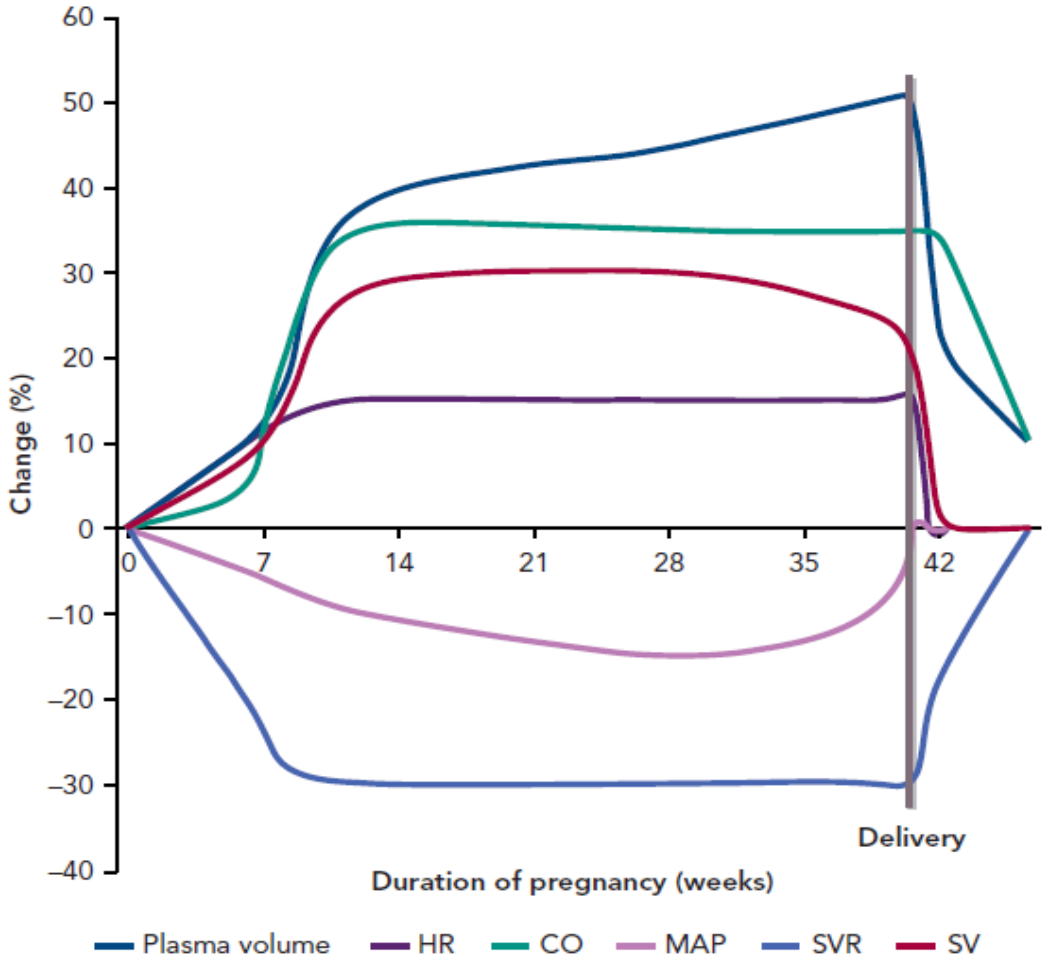
Stage C

Evidence of heart dysfunction with symptoms.

Stage D

Symptoms of heart failure despite maximal therapy.

The stages denote the level of risk developing heart failure on through the development of advanced heart failure. The stages are progressive and correlated to treatment plans.



CO = cardiac output; HR = heart rate; MAP = mean arterial pressure; SV = stroke volume; SVR = systemic vascular resistance. Source: Halpern et al.[21] Reproduced with permission from McGraw Hill.

Fig. 2 Hemodynamic changes throughout pregnancy

- ✓ Oxygen consumption increases 20% to 60% and peaks at term
- ✓ Oxygen delivery slightly increases from 700-1400ml/min and peaks at term
- ✓ Blood volume increases from 45% to 50% and peaks at 32 weeks of gestation

- ✓ Plasma volume increases markedly 45% to 50% and peaks at 32 weeks of gestation
- ✓ Red cells increases by 25% to 32% and peaks at 30 to 32 weeks of gestation
- ✓ Total body water increases by 6- 8 litres and peaks at term
- ✓ Resistance changes and systemic circulation decrease by 2 %
- ✓ Systemic circulation also decreases by 2 %
- ✓ Pulmonary circulation decreases by 34 % at 34 weeks of gestation
- ✓ Myocardial contractility increases by 20-30% and peaks at term
- ✓ Cardiac output increases by 30 - 40 % and peaks at term
- ✓ Uteroplacental circulation increase by 100 % and attains its maximum at term.

RISK FOR MATERNAL MORTALITY CAUSED BY VARIOUS HEART DISEASES

GROUP 1 (MINIMAL RISK)

- ✓ Atrial Septal Defect
- ✓ Ventricular Septal Defect
- ✓ Patent Ductus Arteriosus
- ✓ Pulmonary or Tricuspid Disease
- ✓ Tetralogy of Fallot Corrected
- ✓ Bioprosthetic Valve
- ✓ Mitral Stenosis NYHA class 1 and 2

Mortality Rate is 0.1%

GROUP 2 (MODERATE RISK)

- ✓ Mitral Stenosis NYHA Class 3 and 4
- ✓ Aortic Stenosis
- ✓ Coarctation of Aorta Without Valvular Involvement
- ✓ Tetralogy of Fallot Uncorrected
- ✓ Previous Myocardial Infarction
- ✓ Marfan's Syndrome With Normal Aorta

Mortality Rate is 5-15%

GROUP 2B

- ✓ Mitral stenosis with atrial fibrillation
- ✓ Artificial valve

GROUP 3 (MAJOR RISK)

- ✓ Pulmonary Hypertension
- ✓ Coarctation of Aorta With Valvular Involvement
- ✓ Marfan's Syndrome With Aortic Involvement
- ✓ Eisenmenger's Syndrome
- ✓ Peripartum Cardiomyopathy

Maternal Mortality is 25- 50 %

MANAGEMENT:

Management of pregnant ladies mainly concentrates to reduce the maternal and fetal mortality and morbidity. There should always be a team of cardiologist, gynaecologist, anesthestist through out the pregnancy and puerperium.

Rule of 5 for assessment of cardiac function in pregnanat ladies.

- Five occasions are at (12-16WEEKS) and at (28-32WEEKS) of gestation
- Five weeks before expected date of delivery,
- Five hours after onset of labour and
- Five minutes after delivery.

GENERAL GUIDELINES:

- During the first antenatal visit, patient should be thoroughly assessed in many developing countries, many patients are diagnosed only during the pregnancy. the most common complaint a patient with heart disease has is breathlessness.
- Any patient with breathing difficulty should be assessed carefully. Physician should evaluate every girl/ women attending medicine OPD to evaluate cardiac disease so that future pregnancy can be safe[65].
- The next common symptom is syncope.
- Chest pain is usually a predictor of ischemic heart disease.
- Physical examination should be done carefully. and once diagnosed they should treated carefully.
- Our aim is to detect complications like acute pulmonary edema , disturbance of cardiac rhythm[68] .

- Premature atrial and ventricular ectopic beats are more commonly seen in pregnancy[69]. There is an increase in pulse volume but the mean right atrial pressure is unchanged 10mmHg[70]
- A routine ECG should be interpreted.
- An ECHO should be done for all antenatal mothers, so that occult disease can be diagnosed. Echocardiography provides information about disease etiology, leads to accurate assessment of disease severity and is a powerful means of monitoring progression.
- Strict bed rest is recommended. Avoidance of physical activity, stress, infection, and emotional conditions. These are the factors which aggravate the cardiac output[65,66,67,68]
- Anemia patients should be treated with haematinics. calorie restriction should be adviced so that obesity can be mainly reduced which is also a prime source of giving burden to the heart
- Maternal death is noted and one of the main cause will be infective endocarditis [71,72]. Infection like respiratory or urinary tract infection should be treated with antibiotics. Other infections like pneumonia, pyelonephritis demand immediate hospitalization and needs high dose of antibiotics.

ANAESTHESIA AND ANALGESIA:

Anesthesia requires careful observation, which can lead to hemodynamic instability conditions[33]. Initially morphine was used but now it has been stopped.[67]

- ✓ Pudendal and paracervical blocks are safe
- ✓ Spinal or saddle anaesthesia causes hypertension.

- ✓ Epidural anesthesia are preferred since it decreases cardiac output and venous return causing peripheral vasodilatation. The use of epidural anesthesia is not used in Eisenmeger syndrome and Hypertrophic Cardiomyopathy.

Labour:

Most of the cardiac patients go for normal labour without any complications. induction of labour is only done in obstetrical indications.

- ✓ Propped up positon is preferred among the cardiac patients so that she is comfortable and can breathe without any difficult, and should be in left lateral position.
- ✓ Nasal oxygen should be kept. Intravenous fluid should be given cautiously to prevent pulmonary edema[73]
- ✓ Continuous fetal heart rate monitoring should be there throughout the pregnancy.

2nd Stage of Labour:

- ✓ Prophylactic forceps and vacuum delivery can reduce the second stage of labour.
- ✓ Usually after delivery there is increase in the venous return and cardiac output which should be managed promptly.

3rd Stage of Labour:

- ✓ Ergometrine is contraindicated as there is a risk of pulmonary edema
- ✓ Oxytocin causes decrease in the peripheral resistance. hence bolus dose of 5 units of oxytocin.
- ✓ The most dangerous complication is pulmonary edema which usually occurs after delivery.

CARDIAC DISEASE IN CESAREAN SECTION:

Cesarean section is usually done on obstetrical indications. It is usually performed in patients with severe heart disease and persistent pulmonary congestion[75]

In case of cardiac failure it is better to perform elective caesarean section after getting consent from the mother. General or Epidural Anesthesia is usually given.

PUERPERIUM:

During Puerperium cardiac patients are at increased risk of pulmonary embolism and venous thrombosis. Adequate rest with ambulation are encouraged. infective endocarditis can be avoided in labour and puerperium by giving prophylactic antibiotics.

Hence in order to avoid thrombosis, special supervision by cardiologist and obstetrician should be there.

TERMINATION OF PREGNANCY:

Severe heart disease patients must be considered termination of pregnancy. Women at high risk who were not diagnosed prior to pregnancy need to terminate the pregnancy following advice of cardiologist and obstetrician.

If termination is decided it is better to do in early weeks of pregnancy. age, parity, NYHA class should be considered before doing the procedure. The best choice is suction and curettage. Both hysterotomy and prostaglandin induction carries risk during termination of pregnancy [76]

CONTRACEPTION:

- Oral contraception - risk of hypercoaguability, thrombosis formation, hypertension and hyperlipidemia are more. low dose OC pills have low risk.
- IUCD- causes menorrhagia and anemia and hence must be avoided in women on anticoagulant.
- Barrier methods - are safe but have less efficacy
- Laparoscopic tubal ligation is done at six weeks of delivery.

RHEUMATIC HEART DISEASE

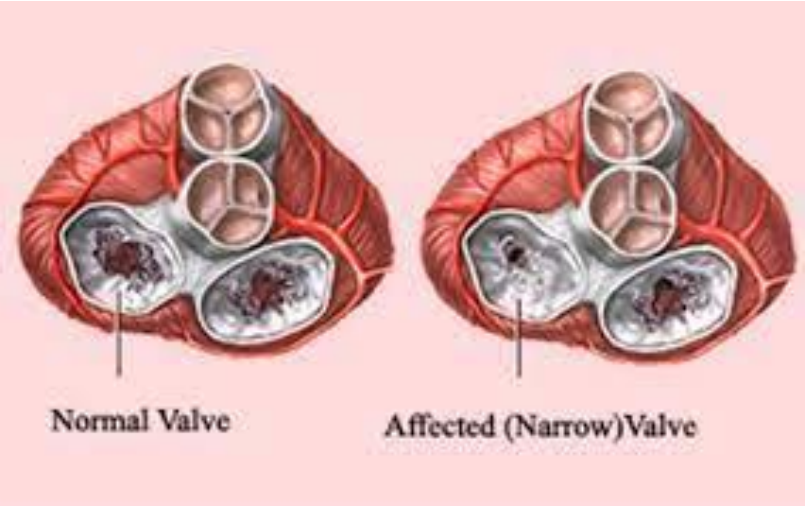


Fig.3 Valvular lesion Rheumatic Heart Disease

During any pregnancy there is an increase in blood volume of 30% - 50% resulting in increased pressure on the heart valves. For women with rheumatic heart disease this increased pressure presents increased maternal and/or foetal risks.

It is not uncommon for women to be unaware that they have rheumatic heart disease until pregnancy. This is because the added stress on the heart can result in symptomatic rheumatic heart disease where previously there were no symptoms.

Pregnancy can lead to the appearance or worsening of symptoms including shortness of breath with simple activity, and waking at night out of breath. For women with more severe rheumatic heart disease, it could lead to the development of much more serious symptoms such as pulmonary oedema, atrial fibrillation or clotting. These changes begin in the first trimester but peak at 28-30 weeks and are sustained until term, meaning most women with valvular heart disease become more symptomatic in the third trimester.

INVESTIGATIONS:

- Assess heart rate, heart sounds for gallops, and blood pressure.
- Note skin color, temperature, and moisture.
- Check for peripheral pulses including capillary refill.
- Assess for reports of fatigue and reduced activity tolerance.
- Inspect fluid balance and weight gain (weigh the mother prior to breakfast).
- Monitor ECG for rate, rhythm, and ectopy.
- Provide adequate rest with semi fowler's position.
- Administer oxygen therapy as prescribed.

MANAGEMENT OF RHEUMATIC HEART DISEASE IN PREGNANCY

- **Women with moderate or severe rheumatic heart disease** require close supervision, normally at a tertiary referral centre with cardiology and intensive care facilities.
- **Women requiring anticoagulation during pregnancy** are at additional risk of complications. Where a heart valve has been replaced, or for atrial

fibrillation, anticoagulants including Warfarin or low-molecular weight heparin (LMWH) are mostly taken. Both groups of anticoagulants can cause problems, either by increased risk of thromboembolism or risk to the foetus. Specialist review and close monitoring is critical and is not routinely available outside large urban centres.

- **Women on secondary prophylaxis** should continue treatment. Any prescribed antibiotic secondary prophylaxis (usually Benzathine penicillin injections every 21-28 days) is safe during pregnancy. It is vital the woman does not miss any injections to avoid a recurrence of rheumatic fever and worsening of the rheumatic heart disease.
- **Many women with a history of acute rheumatic fever or mild rheumatic heart disease** require no special management during pregnancy but should have careful assessment preconception, or early in pregnancy, by a cardiologist and obstetrician to establish the safest birth pathway.
- Additional considerations for management of rheumatic heart disease in pregnancy for women in remote and rural locations
- Pregnant women with rheumatic heart disease in rural and remote locations may be required to be away from home to stay in urban centres while they wait for delivery.
- It is important that secondary prophylaxis is still administered if prescribed, and women are supported to access the most appropriate service to provide secondary prophylaxis.

- Reducing stress from isolation should be a consideration and appropriate supports and family escorts available whenever possible.
- Pregnancy is an opportunity to support the woman to establish links with social and support services. This requires careful coordination and communication between original health workers, remote area midwives, district medical officers, obstetricians and cardiologists.
- While every woman's situation is different, it should be considered that pregnant women with rheumatic heart disease may also be managing multiple social, practical and emotional issues. Risk factors of rheumatic heart disease include poverty, overcrowded housing, reduced access to medical care, food security, domestic violence and substance abuse issues.[11]

EFFECTS OF PREGNANCY ON RHEUMATIC HEART DISEASE:[13]

During any pregnancy there is an increase in blood volume of 30 to 50% resulting in increased pressure on the heart valves. For women with RHD this increased blood pressure presents increased maternal and/or fetal risks. This is because the added stress on the heart can result in symptomatic RHD where previously there were no symptoms.

Maternal Pregnancy can lead to the worsening of symptoms including the following:

- Shortness of breath with simple activity.
- Shortness of breath Waking at night.
- Pulmonary edema.
- Atrial fibrillation or clotting.

These changes begin in the first trimester but peak at 28 to 30 weeks and are sustained until term, meaning most women with valvular heart disease become more symptomatic in the third trimester.

FETAL COMPLICATIONS:

- Abortion
- Intrauterine growth retardation
- Still birth
- Premature labor
- Asphyxia
- Respiratory distress syndrome

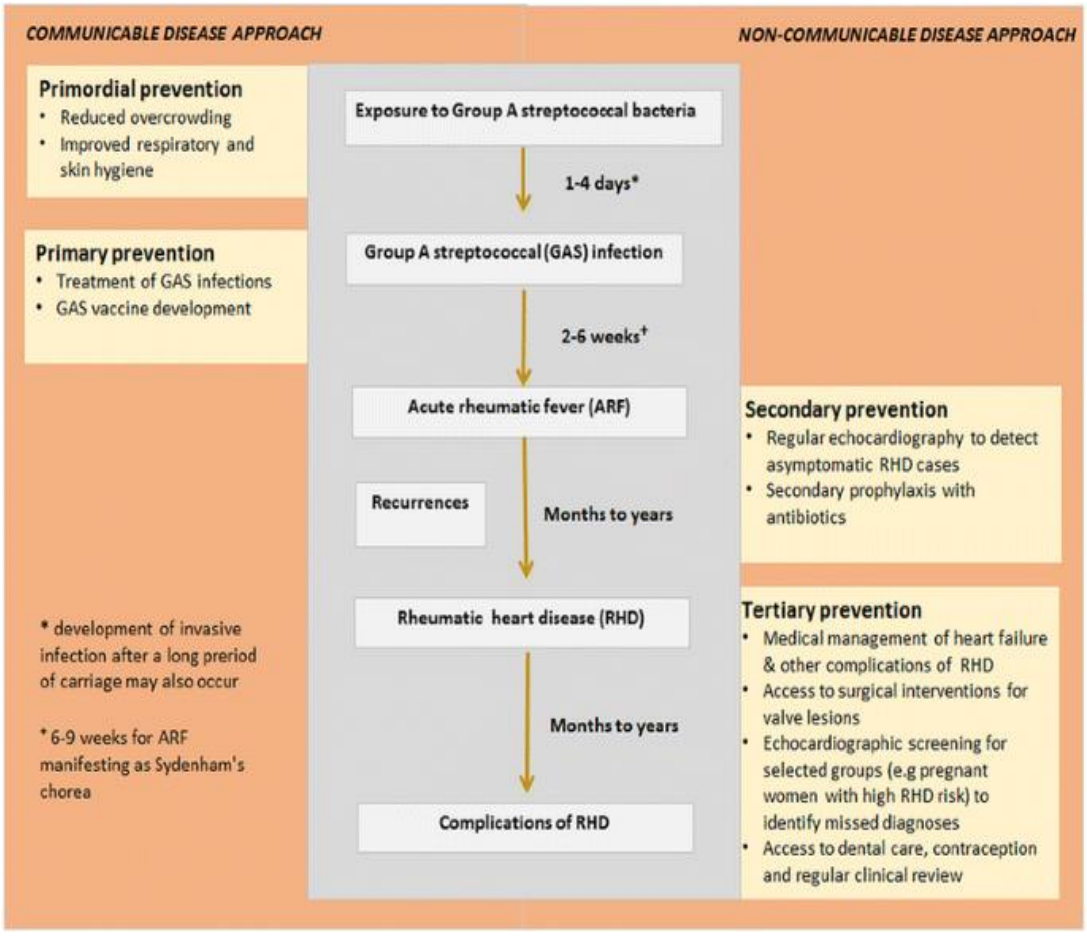


Fig. 4 Management of RHD

A study published by Desai and associates (2000)[12] stated that pregnant patients with Mitral Stenosis develop symptoms only when the diameter of mitral valve orifice is < 2.5 cm^2.

CONGENITAL HEART DISEASE

The number of pregnancies in women with congenital heart disease has increased over the past decades and is expected to rise further in the coming years.[37] Physiological changes in the cardiovascular system during pregnancy may bear a risk for those with congenital heart disease who are not able to sufficiently adapt[38] Subsequently, heart failure, arrhythmias and worsening of the cardiac condition may complicate pregnancy and expose mother and child to an increased risk of morbidity and mortality**.**

In the study mitral stenosis was the commonest lesion in the rheumatic heart disease group and atrial septal defect was the commonest among the congenital heart diseases. This was in agreement with the study conducted by Bhatla et al (2003)[39]

According to Khairy et al (2004)[40] In a large single-center cohort of pregnant women with congenital heart disease, maternal cardiac and neonatal complications were considerable. Patients with impaired subpulmonary ventricular systolic function and/or severe pulmonary regurgitation are at increased risk for adverse cardiac outcomes. Despite this high maternal cardiac complication rate, with careful surveillance and prompt recognition of symptoms, an overall favorable response to therapy was noted, with no maternal deaths.

According to Koregol et al (2009)[41] The prevalence of pregnancy complicated by rheumatic heart disease (RHD) has decreased in developed countries

(1,8). Former ratio of 3:1 for RHD to congenital heart disease (CHD) in patients with cardiac disease complicating pregnancy is now essentially reversed

Atrial septal defects (ASDs) are one of the most common CHDs in pregnancy. ASDs may be newly diagnosed in pregnancy because the hemodynamic changes exaggerate right ventricular (RV) volume and may unmask an undiagnosed ASD.[42,43,44]

According to Weinberg study - Unrepaired (mWHO Class II) or repaired (mWHO Class I), ASDs are usually well tolerated in pregnancy unless associated with cyanosis or pulmonary hypertension. Women are at a <5% risk of arrhythmias, which occur more frequently in those with unrepaired shunts or those with shunts repaired at older ages. There is also a small risk of paradoxical emboli; thus, any signs of deep venous thrombosis should be investigated. Aspirin should be considered after 12 weeks because there is an increased rate of preeclampsia. Other complications include SGA and higher fetal or perinatal mortality. Rarely will ASD closure be required during pregnancy unless cyanosis occurs without significantly elevated pulmonary vascular resistance. Similarly, women with repaired small ventricular septal defects (VSDs) or small patent ductus arteriosus without an increase in pulmonary vascular resistance tolerate pregnancy well. Vaginal delivery is usually well tolerated with a consideration for IV air filters to prevent air embolisms.

Prepregnancy counselling and evaluation is essential in woman with CHD, especially those at highest risk.[42,43] Unfortunately, most women do not receive appropriate counselling and optimization of their CHD. Without appropriate prepregnancy counselling and optimization of their CHD, women have double the risk of maternal mortality and HF.[48]

One of the first steps in counselling a patient with CHD is to determine their risk with the modified WHO (mWHO) classification.[43] Women with mWHO I, such as those with mild pulmonary stenosis or a repaired simple atrial septal defect (ASD), have a small increase in morbidity and no increase in mortality compared with the general population. Conversely, mWHO IV, such as woman with symptomatic severe aortic stenosis or severe systemic ventricular dysfunction, have the highest risk of maternal complications, with cardiac event rates of 40–100%. mWHO IV individuals should be counselled against pregnancy and, if pregnancy occurs, discussions regarding termination are essential. Women with stenotic bicuspid aortic valve and repaired coarctation without significant residual narrowing or aneurysm are classified as mWHO II–III and have an intermediate risk of morbidity and mortality with a cardiac event rate of 10–19%. Other risk scores, such as CARdiac disease in PREGnancy (CARPREG I and II) and Zwangerschap bij Aangeboren HARtAfwijking (ZAHARA), further assist in stratifying a patient's risks[45,46,47] The latter risk score is focused on CHD.

The next step in risk stratification is to determine the anatomic and physiological complexity of the defect.[42,43] Reviewing prior surgical and catheterization reports assists in understanding the underlying anatomy and potential complications. Echocardiography further determines the underlying anatomy and spectrum of CHD (e.g. from mild to severe aortic stenosis). However, an echocardiogram may not reveal the true extent of an aortic aneurysm or stenosis of the aorta. Therefore, women with coarctation of the aorta (CoA) should undergo an MRI or ECG-gated CT scan prior to pregnancy. If the woman is pregnant at the time of presentation, an MRI without gadolinium after the first trimester may be performed.

ELLIS-VAN CREVELD SYNDROME

Ellis-van Creveld syndrome (EVC) is a rare autosomal recessive disorder resulting from a genetic mutation in two genes, EVC1 and EVC2, mapping both in locus 16 on the short arm of chromosome 4 (4p16) in a head-to-head configuration.

EVC presents with a characteristic tetrad of clinical manifestations:

1. Chondrodysplasia of the long, tubular bones resulting in disproportionate dwarfism, and an exceptionally long trunk is the most common clinical feature, producing a serious ossification defect.[49] The severity of short limbs increases from the proximal to the distal portions.[49]
2. Bilateral postaxial polydactyly of the hands, with the supernumerary finger, usually being on the ulnar side [49]. Fingers are sausage shaped with wide hands and feet.[51]
3. Hidrotic ectodermal dysplasia with dystrophic, small dysplastic nails, thin sparse hair, and oral manifestations.[50]
4. Congenital heart malformations in 50% to 60% of cases, the most common being a single atrium and a ventricular septal defect [49]. The associated cardiorespiratory problems are described as the primary cause of decreased life expectancy in these patients.[52]

MITRAL VALVE PROLAPSE

According to Nanna et al (2014)[55] pregnancy with MVP, predisposes toward arrhythmia and sudden cardiac death, or whether the risk of these adverse outcomes is elevated because of the presence of MVP.

Accoding to Yuan et al, (2016)[54] Mitral regurgitation is only complicated in patients with severe mitral valve prolapse. Non-myxomatous mitral valve prolapse poses no or little obstetric risks in terms of pregnancy, labor and neonatal complications; whereas myxomatous mitral valve prolapse is a major etiology of valvular heart disease in women of childbearing age.

According to Wilkie et al (2021)[53] - Diagnosis of mitral valve prolapse with an overall incidence of 16.5 cases per 10,000 pregnancy admissions. Pregnant women with mitral valve prolapse were more likely to have a Preeclampsia, HELLP Syndrome, cardiac arrest, arrhythmia, stroke, heart failure, myocardial infarction, thromboembolism and endocarditis compared to women without mitral valve prolapse.

SURGICALLY CORRECTED HEART DISEASE:

According to Bhatla et al (2003)[77] Surgical correction of the cardiac lesion prior to pregnancy was associated with better pregnancy outcome. Pregnant women with prosthetic valves tolerated pregnancy well.

PERIPARTUM CARDIOMYOPATHY

Peripartum cardiomyopathy is idiopathic heart failure occurring in the absence of any determinable heart disease during the last month of pregnancy or the first 5 months postpartum. The incidence varies worldwide but is high in developing nations; the cause of the disease might be a combination of environmental and genetic factors. Diagnostic echocardiographic criteria include left ventricular ejection fraction < 0.45 or M-mode fractional shortening <30% (or both) and end-diastolic dimension >2.7 cm/m^2. Electrocardiography, magnetic resonance imaging, endomyocardial biopsy, and cardiac catheterization aid in the diagnosis and management of peripartum cardiomyopathy.[57]

According to Aoyama et al (2018)[56] to demonstrated serial cardiac changes before the onset of PPCM. We found that the LVEF declined acutely after 35 weeks of gestation, and LV dilation might have preceded the decline in the LVEF, suggesting that LV dilatation might be a predictor for the development of PPCM.

Countries	**Mortality rate**
USA (2004)[59]	6%-10%
SOUTH (2012)[58] AFRICA	10%-28%
INDIA (2021)[81]	7.7%

According to Isezuo SA and Abubakar SA[63], et al (2003-2005), the mortality rate was 12 %. And the finding of the study was peripartum cardiomyopathy outcome is influenced by cardiothoracic index, LVEF, and diastolic pressure. Patients who dies had lower diastolic pressure and higher cardio thoracic index.

According to Elkayam U, et al[62] (2005) the mortality rate was 9% and the finding of the study was subsequent pregnancy in peripartum cardiomyopathy patients are associated with decrease in LV function

According to Slwa K, et al[61] (2011) the mortality rate was 10 %. And the finding of the study was peripartum cardiomyopathy rate remains high after 6 months

According to Brar SS, et al[60] (2017), the mortality rate was 3.3%. Peripartum cardiomyopathy was highest in blacks and lowest in Hispanic populations.

INFECTIVE ENDOCARDITIS

It is a major complication which occurs in heart lesions like valvular and congenital heart disease except ASD and in women with prosthetic valves and shunts. Bacteremia is mostly encountered during vaginal and ceasarean section.

ANTIBIOTIC PROPHYLAXIS FOR INFECTIVE ENDOCARDITIS:

(AMERICAN HEART ASSOCIATION AND AMERICAN COLLEGE OF OBSTETRICS AND GYAECOLOGISTS)

- **Recommened only for high risk women**
  - Women with prosthetic valves
  - Prior endocarditis
  - Cyanotic heart disease
  - Patients with cardiac transplantation

- **Antibiotic regimen:**

In Active Labour

Injection ampicillin 2gm IV or IM single dose plus injection gentamycin 1.5mg/kg IV. Followed 6hours later by injection ampicillin 1gm IM or IV or amoxycillin 2gm oral.

If allergic to penicillin inj vancomycin 1gm IV over 1 to 2 hours plus injection gentamycin 1.5mg/kg IV OR cephazolin or ceftriaxone 1gm IV OR clarithromycin / azithromycin 500mg oral OR clindamycin 600mg oral.

Infective endocarditis in pregnancy is associated with high maternal and fetal morbidity and mortality and is estimated to complicate approximately 1 in 100,000 pregnancies.

Echocardiogram, which revealed a large mobile mass on the aortic coronary cusp and a small mass on the non-coronary cusp. There was significant aortic regurgitation[64]

CONTRACEPTION IN WOMEN WITH CARDIAC DISEASE:

- **Progesterone only pills**
  - Minipill
  - Depot-medroxyprogesterone acetate
  - Levonorgestrel intrauterine system
- **Surgical methods**
  - Tubectomy
  - Vasectomy
- **Risk associated with oral contraception usage:**
  - Hypertension
  - Hyperlipidemia
  - Thromboembolism
  - Hypercoagulability
- **Risk associated with IUCD users:**
  - Vasovagal syncope
  - Infection

CONDITIONS IN WHICH SURGICAL INTERVENTIONS PRIOR TO PREGNANCY IS RECOMMENDED:

- Severe MS or MR
- Severe AS OR AR
- Large ASD or VSD
- PDA with moderate pulmonary hypertension
- Severe coarctation of aorta
- Tetralogy of Fallot

Materials & Methods

STUDY DESIGN: Prospective observational study

STUDY SETTING:

Obstetrics & Gynaecology department, Sree Mookambika Institute of Medical Sciences, Kulasekharam.

STUDY DURATION: 18 months

NUMBER OF GROUPS: 1 group

DETAILED DESCRIPTION OF THE GROUP:

Pregnant women irrespective of the trimester, age, parity attending Obstetrics and Gynaecology department, Sree Mookambika Institute of Medical Science Kulasekharam, who fulfill the inclusion and exclusion criteria are selected.

SAMPLING

TOTAL SAMPLE SIZE OF THE STUDY: 70

SCIENTIFIC BASIS OF SAMPLE SIZE USED IN THE STUDY:

The prevalence was 58.6% in a study done by 'Sumathi Natarajan et al, 2016'[5]

hence assuming p as 58.6

$$\boldsymbol{n} = \frac{Z_\alpha{}^2 pq}{d^2}$$

Z_α= 1.96

P=58.6

Q=41.4(100-p)

D=20% of p

=11.72

$$\boldsymbol{n} = \frac{(1.96)^2 \text{x } 58.6\text{x}41.4}{11.72^2}$$

$\boldsymbol{n}$= 70

SAMPLING TECHNIQUE USED IN THE STUDY: Convenient sampling

INCLUSION CRITERIA

All antenatal mothers attending OPD irrespective of age, parity, and gestational age will be included in the study.

EXCLUSION CRITERIA

- Patients with cardiovascular diseases before pregnancy.
- Rhythm disorders
- Hypertensive heart diseases
- Patients not willing to give consent.

METHOD

After approval of the study protocol by our institutional Research committee and Human Ethical committee, written informed consent will be taken from pregnant women attending Obstetrics and Gynaecology out department, Sree Mookambika Institute of Medical Science Kulasekharam, who fulfill the inclusion and exclusion criteria. Total 70 women will be included in the study. A detailed history will be taken which will include the patient's education, occupation, socio-economic status, menstrual history, obstetric history, past medical and surgical history and personal history. A thorough general physical examination will be done. Vitals signs and all systems will be examined. All women will be subjected to routine antenatal tests and Electrocardiography and Echocardiography (ECHO). Based on the symptoms all the patients will be classified according to New NYHA functional classification. Patients will be advised to have regular antenatal check-up thereafter. The mode of delivery and complications will be documented. Maternal complications includes anemia, maternal death which can be due to acute

pulmonary edema, infective endocarditis, congestive cardiac failure pulmonary hypertension, arrhythmias. Fetal complications includes spontaneous miscarriage, preterm labour, fetal growth restriction.

STATISTICAL METHODS OF ANALYSIS:

Data will be entered in Microsoft excel version 2007.

SIGNIFICANCE LEVEL:

0.05 ($p<0.05$) at 95% confidence level

STATISTICAL TESTS USED FOR DATA ANALYSIS:

Chi Square test

SOFTWARE USED FOR STATISTICAL ANALYSIS:

SPSS software trial (Version 20.0)

Analysis & Interpretation

STATISTICAL ANALYSIS:

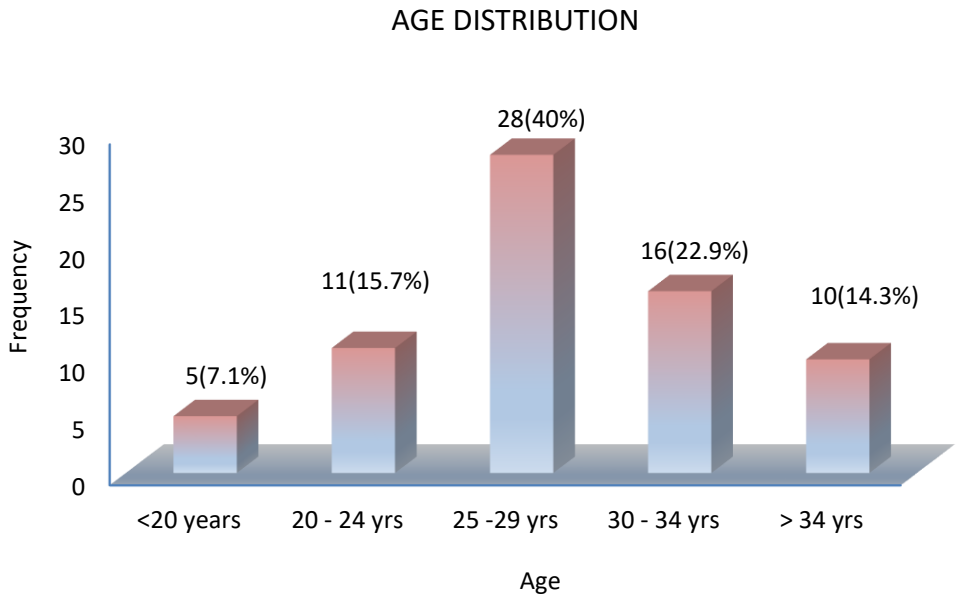
The data was expressed in number, percentage, mean and standard deviation. Statistical Package for Social Sciences (SPSS 20.0) version used to calculate the mean and standard deviation. Number and percentage was calculated by using MS Excel 2007.

AGE DISTRIBUTION

A total of 70 antenatal women were included in the study. Most of them belong to the age group of 25-29 years (40%) and the least were of the age group of below 20 years (7.1%).

Table 1: Age Distribution among all antenatal patient

Age	Frequency	Percent
< 20 years	5	7.1
20 - 24 yrs	11	15.7
25 -29 yrs	28	40.0
30 - 34 yrs	16	22.9
> 34 yrs	10	14.3
Total	**70**	**100.0**



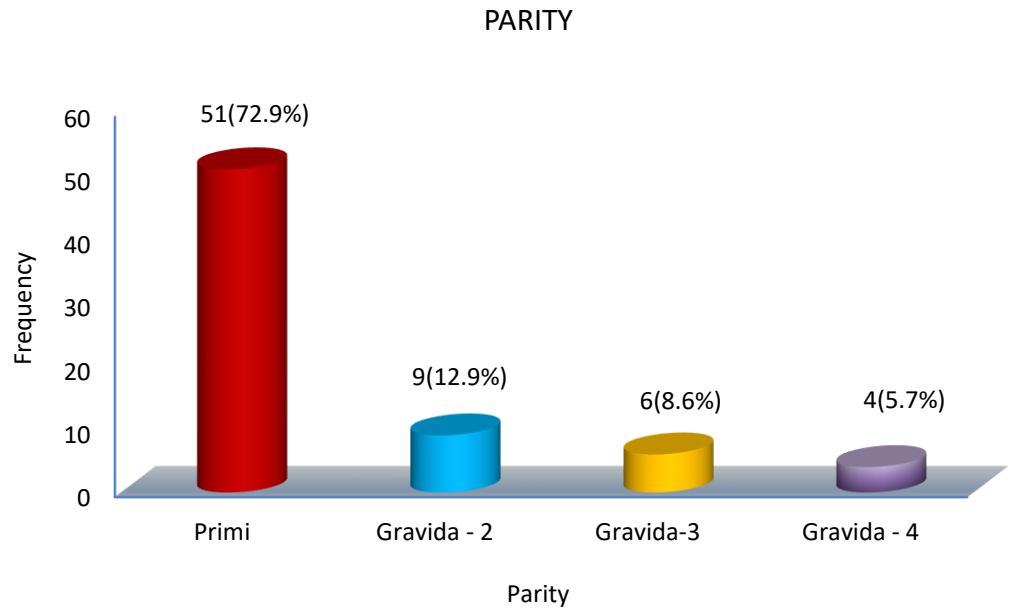
Graph 1: Age Distribution among all antenatal patient

PARITY

Among the pregnant women, 51(72.9%) were primigravida and 19 (27.1%) were multigravida.

Table 2: Parity among all antenatal patient

Parity	Frequency	Percent
Primi	51	72.9
Gravida – 2	9	12.9
Gravida-3	6	8.6
Gravida – 4	4	5.7
Total	**70**	**100.0**



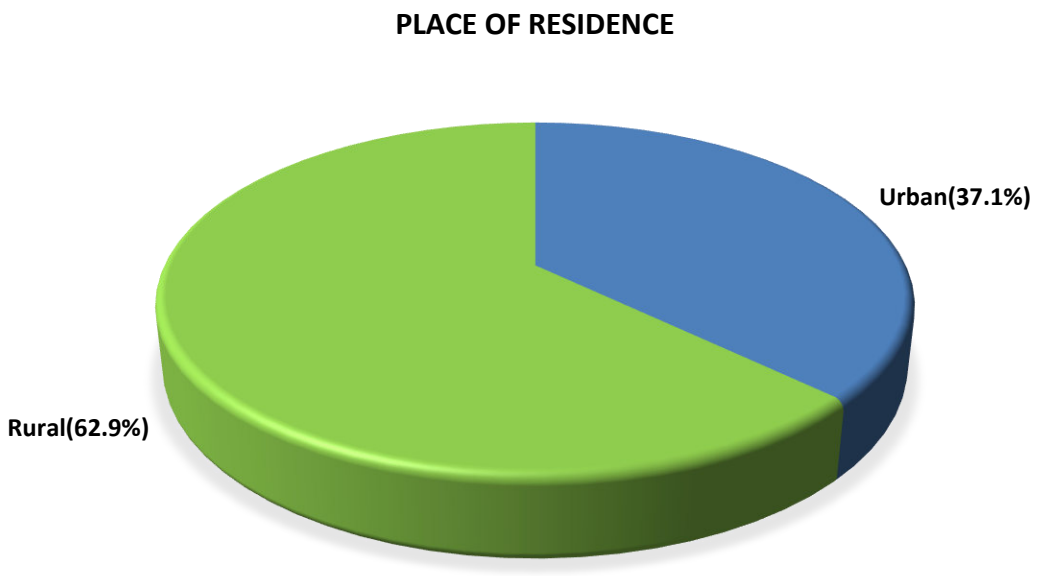
Graph 2: Parity among all antenatal patient

PLACE OF RESIDENCE

Among 70 pregnant women, 26(37.1%) were from Urban area and 44(62.9%) were from rural area.

Table 3: Place of Residence

Place of residence	Frequency	Percent
Urban	26	37.1
Rural	44	62.9
Total	**70**	**100.0**



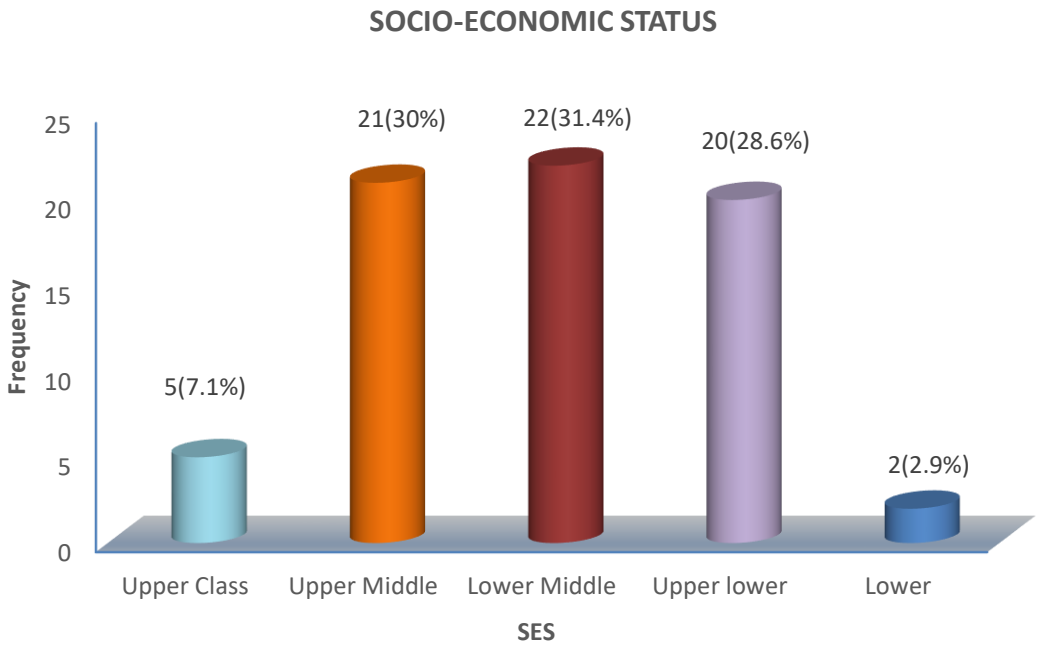
Graph 3: Place of Residence

SOCIO- ECONOMIC CLASS

Most of the pregnant women belong to the lower middle class (31.45%) and the least belong to the lower class (2.9%).

Table 4: Socio- Economic Class

Socio-economic class	Frequency	Percent
Upper Class	5	7.1
Upper Middle	21	30.0
Lower Middle	22	31.4
Upper lower	20	28.6
Lower	2	2.9
Total	**70**	**100.0**



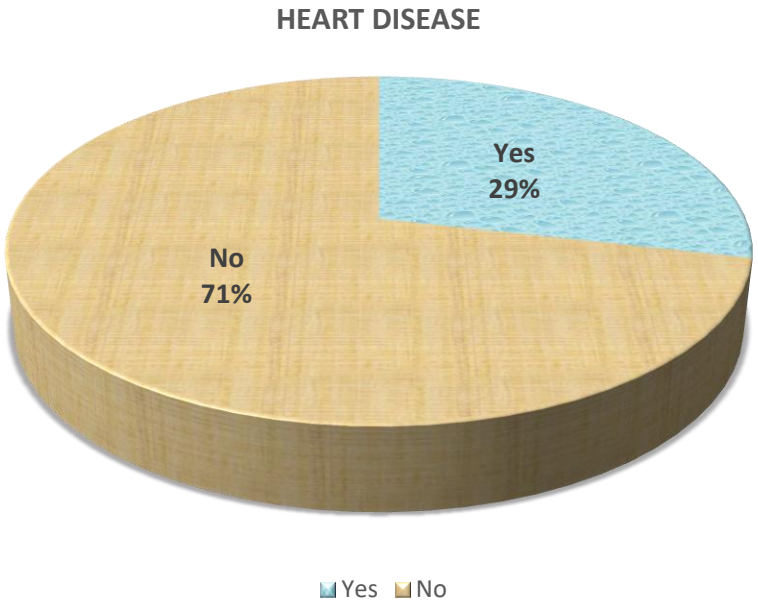
Graph 4: Socio- Economic Class

HEART DISEASE

The prevalence of cardiovascular disease among pregnant ladies using echocardiogram was 28.6%

Table 5: Heart Disease

Heart disease	Frequency	Percent
Yes	20	28.6
No	50	71.4
Total	70	100.0



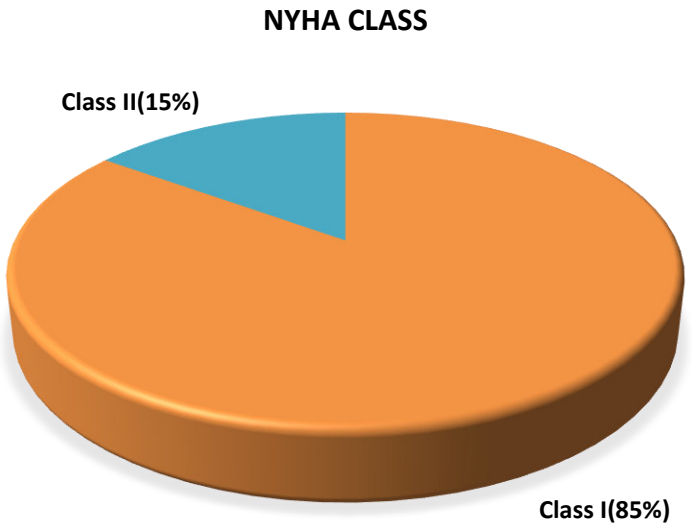
Graph 5: Heart Disease

NYHA CLASS

Among those diagnosed as cardiac disease complicating pregnancy, NYHA functional class-,85% were under NYHA class I followed by NYHA class II (15%).

Table 6: NYHA Class Cardiac disease complicating pregnancy

NYHA CLASS	Frequency	Percent
Class I	17	85.0
Class II	3	15.0
Total	20	100.0



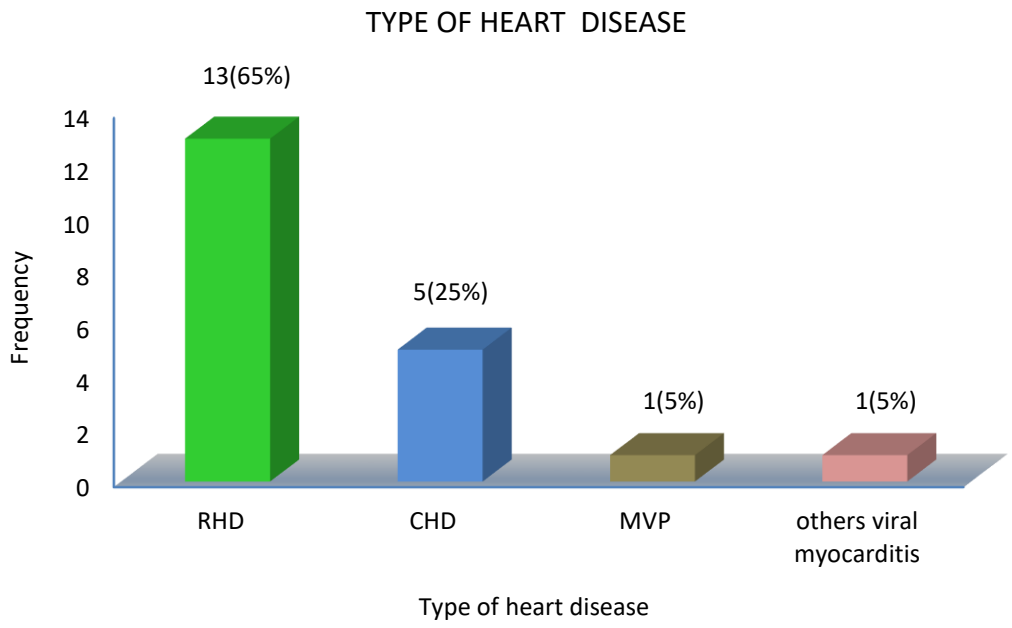
Graph 6: NYHA class Cardiac disease complicating pregnancy

TYPE OF HEART DISEASE

The most common group of cardiac disease among pregnant women was rheumatic heart disease (65%), 25% had congenital heart disease,5% had MVP and remaining 5% had other viral myocarditis.

Table 7: Type of Heart Disease

Type of Heart disease	Frequency	Percent
RHD	13	65
CHD	5	25
MVP	1	5
Others Viral Myocarditis	1	5
Total	20	100



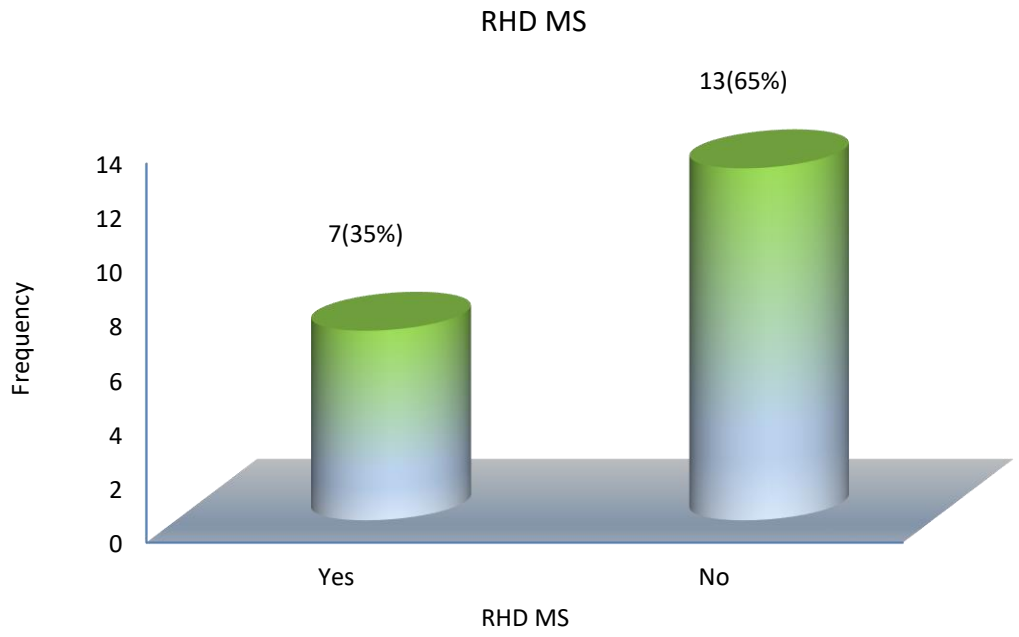
Graph 7. Type of Heart Disease

RHEUMATIC ETIOLOGY – MITRAL STENOSIS

Among the pregnant women with rheumatic heart disease, mitral stenosis lesion was found to be 35%.

Table 8: Rheumatic Etiology – Mitral Stenosis

RHD MS	Frequency	Percent
Yes	7	35.0
No	13	65.0
Total	20	100.0



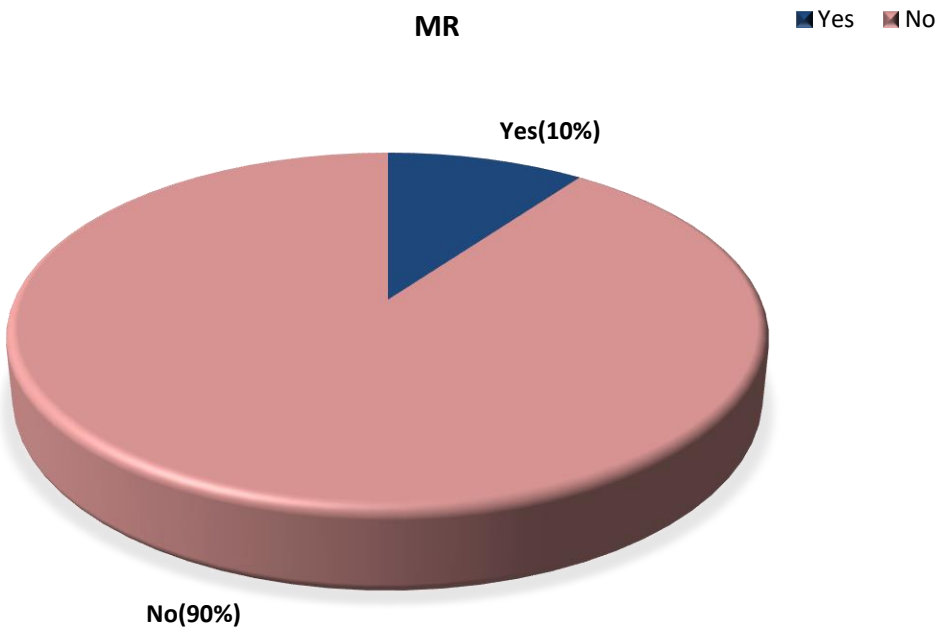
Graph 8: Rheumatic Etiology – Mitral Stenosis

RHEUMATIC ETIOLOGY – MITRAL REGURGITATION

Among the pregnant women with rheumatic heart disease, the frequency of mitral regurgitation was 10%.

Table 9: Rheumatic Etiology – Mitral Regurgitation

MR	Frequency	Percent
Yes	2	10.0
No	18	90.0
Total	20	100.0



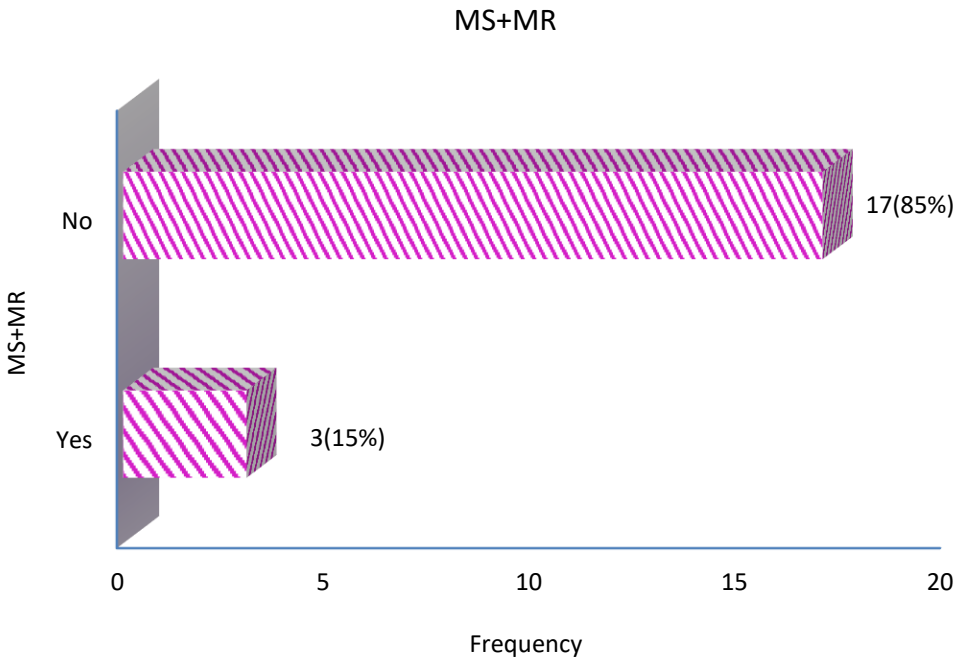
Graph 9: Rheumatic Etiology - Mitral Regurgitation

RHEUMATIC ETIOLOGY -MITRAL STENOSIS AND MITRAL REGURGITATION

Among the pregnant women with rheumatic heart disease, 15% had both mitral stenosis lesion and mitral regurgitation.

Table 10: Rheumatic Etiology -Mitral Stenosis and Mitral Regurgitation

MS + MR	Frequency	Percent
Yes	3	15.0
No	17	85.0
Total	20	100.0



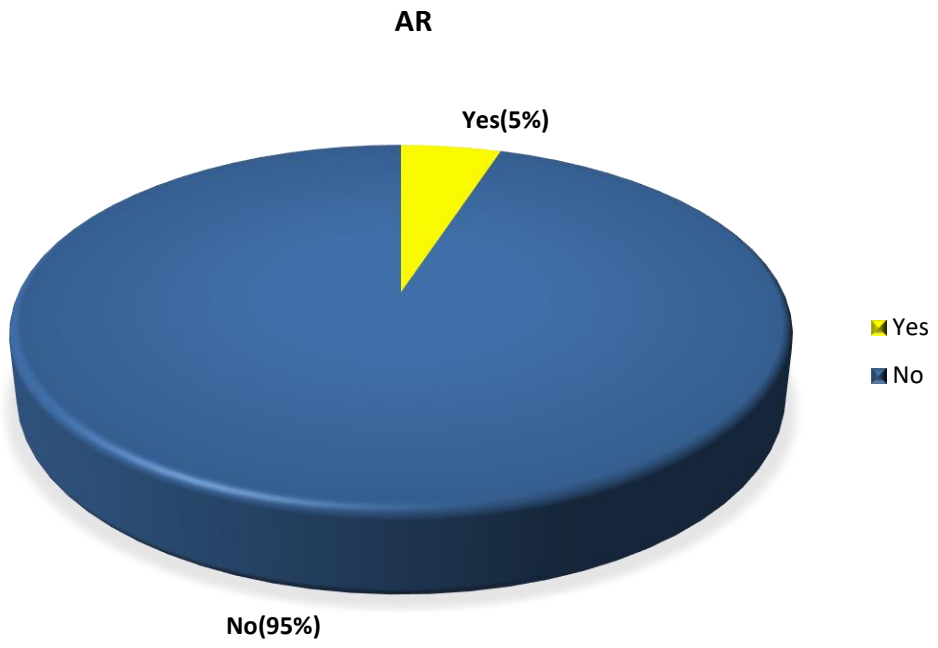
Graph 10: Rheumatic Etiology -Mitral Stenosis and Mitral Regurgitation

RHEUMATIC ETIOLOGY – ATRIAL REGURGITATION

Among the pregnant women with rheumatic heart disease, 5 % had atrial regurgitation.

Table 11: Rheumatic Etiology – Atrial Regurgitation

AR	Frequency	Percent
Yes	1	5.0
No	19	95.0
Total	**20**	**100.0**



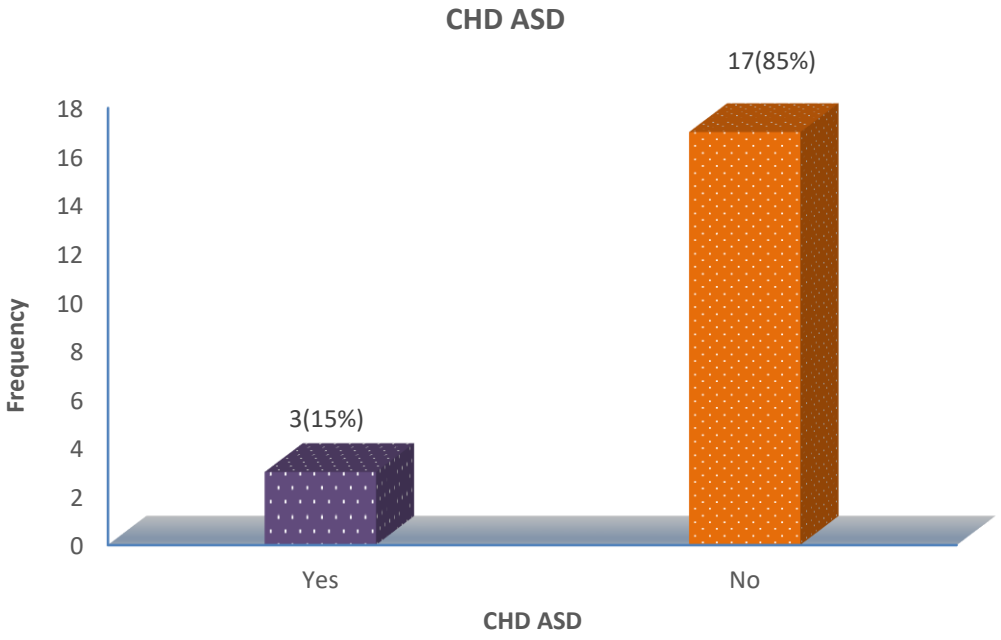
Graph 11: Rheumatic Etiology – Atrial Regurgitation

CHD ETIOLOGY – ATRIAL SEPTAL DEFECT

Among the pregnant women with congenital heart disease, 15% had Atrial septal defect.

Table 12: CHD Etiology – Atrial Septal Defect

CHD ASD	Frequency	Percent
Yes	3	15.0
No	17	85.0
Total	20	100.0



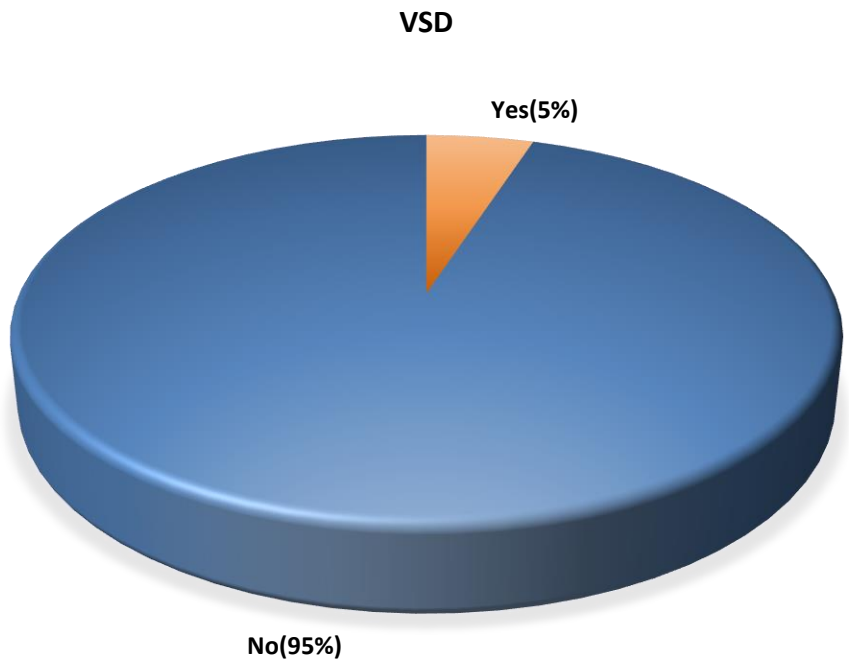
Graph 12: CHD Etiology – Atrial Septal Defect

CHD ETIOLOGY – VENTRICULAR SEPTAL DEFECT

Among the pregnant women with congenital heart disease, 5% had ventricular septal defect.

Table 13: CHD Etiology – Ventricular Septal Defect

VSD	Frequency	Percent
Yes	1	5.0
No	19	95.0
Total	20	100.0



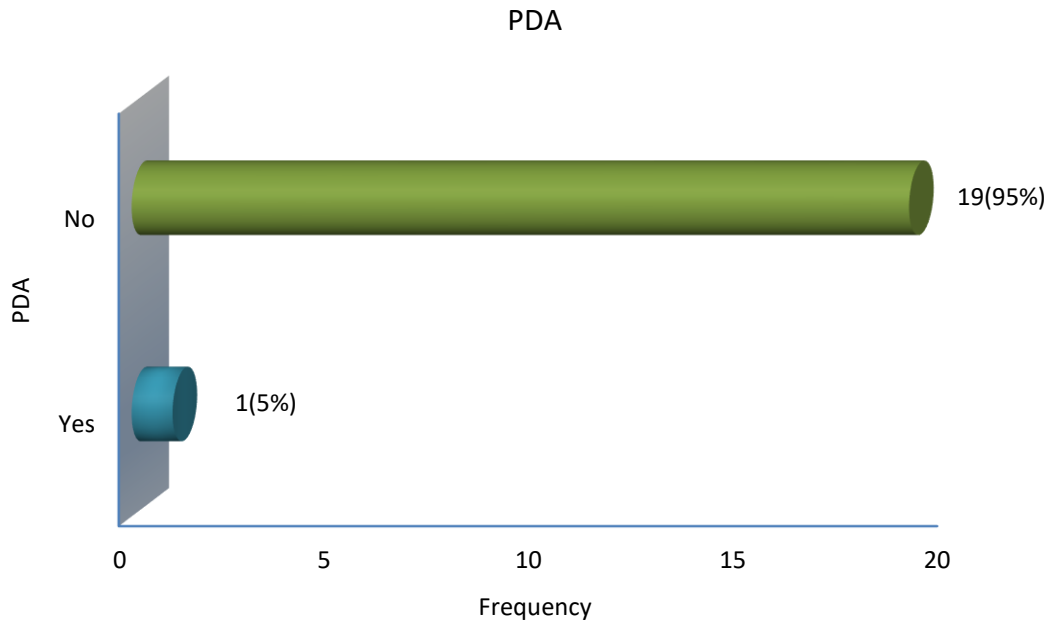
Graph 13: CHD Etiology - Ventricular Septal Defect

CHD ETIOLOGY -PATENT DUCTUS ARTERIOSUS

Among the pregnant women with congenital heart disease, 5% had Patent ductus arteriosus.

Table 14: CHD Etiology -Patent Ductus Arteriosus

PDA	Frequency	Percent
Yes	1	5.0
No	19	95.0
Total	20	100.0



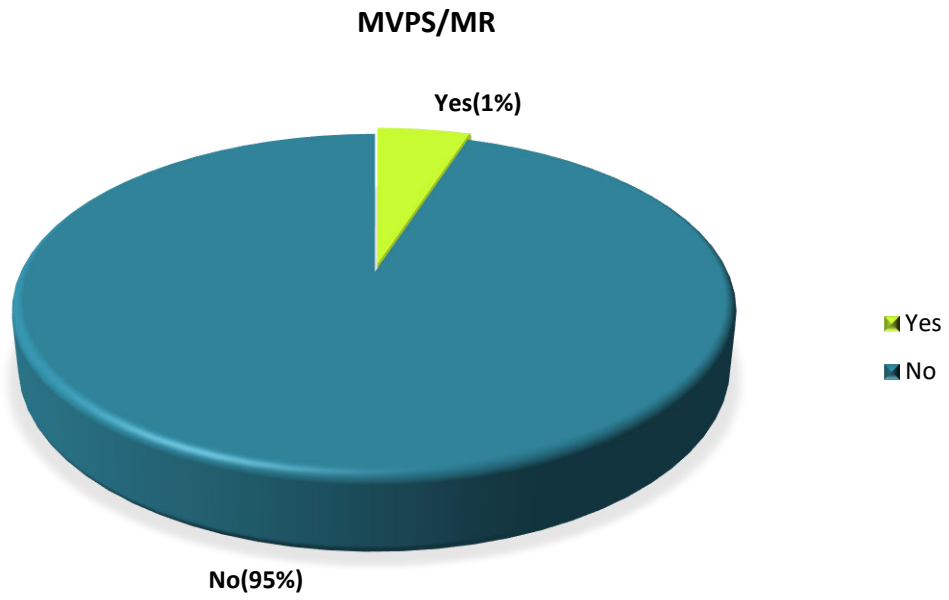
Graph 14: CHD Etiology -Patent Ductus Arteriosus

MITRAL VALVE PROLAPSE

Among the pregnant women with cardiovascular disease, 5% had mitral valve prolapse.

Table 15: Mitral Valve Prolapse

MVPs/MR	Frequency	Percent
Yes	1	5.0
No	19	95.0
Total	20	100.0



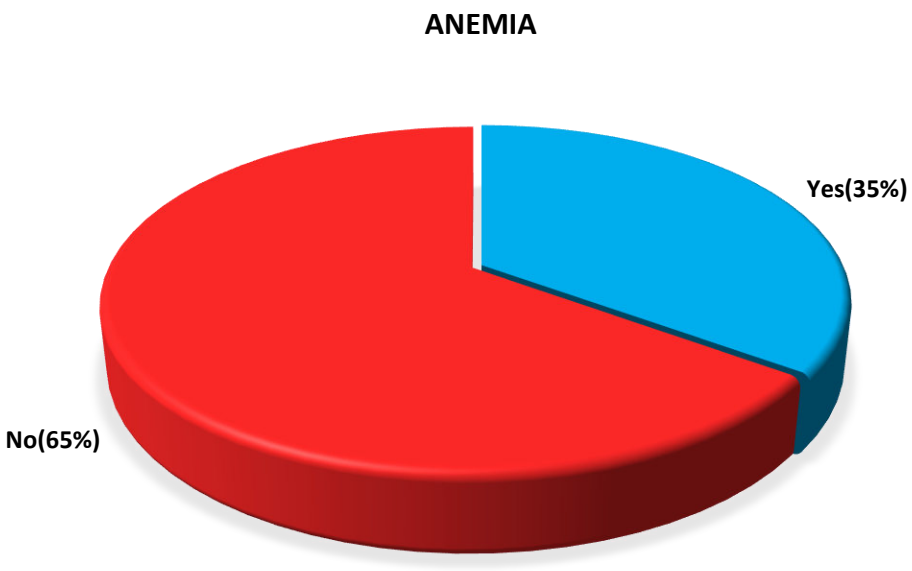
Graph 15: Mitral Valve Prolapse

ANEMIA

Among the pregnant women with cardiovascular disease, 35% were anemic.

Table 16: ANEMIA

ANEMIA	Frequency	Percent
Yes	7	35
No	13	65
Total	20	100.0



Graph 16: ANEMIA

GESTATIONAL TROPHOBLASTIC DISEASE

Among the pregnant women with cardiovascular disease, 15% had Gestational Trophoblastic disease.

Table 17: Gestational Trophoblastic Disease

GHT	Frequency	Percent
Yes	3	15
No	17	85
Total	20	100.0

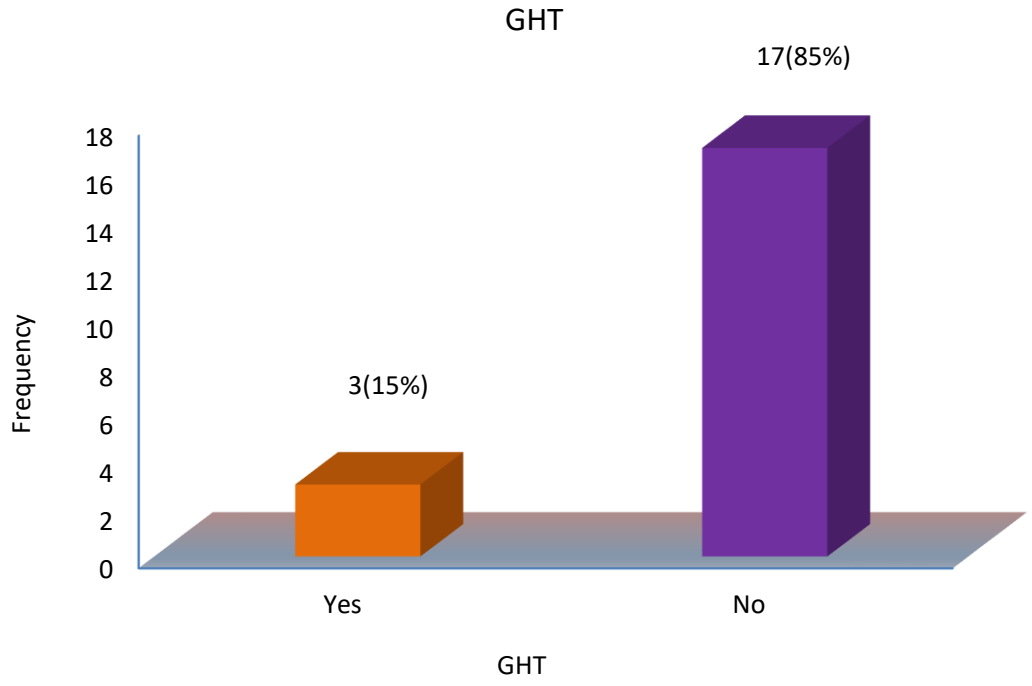


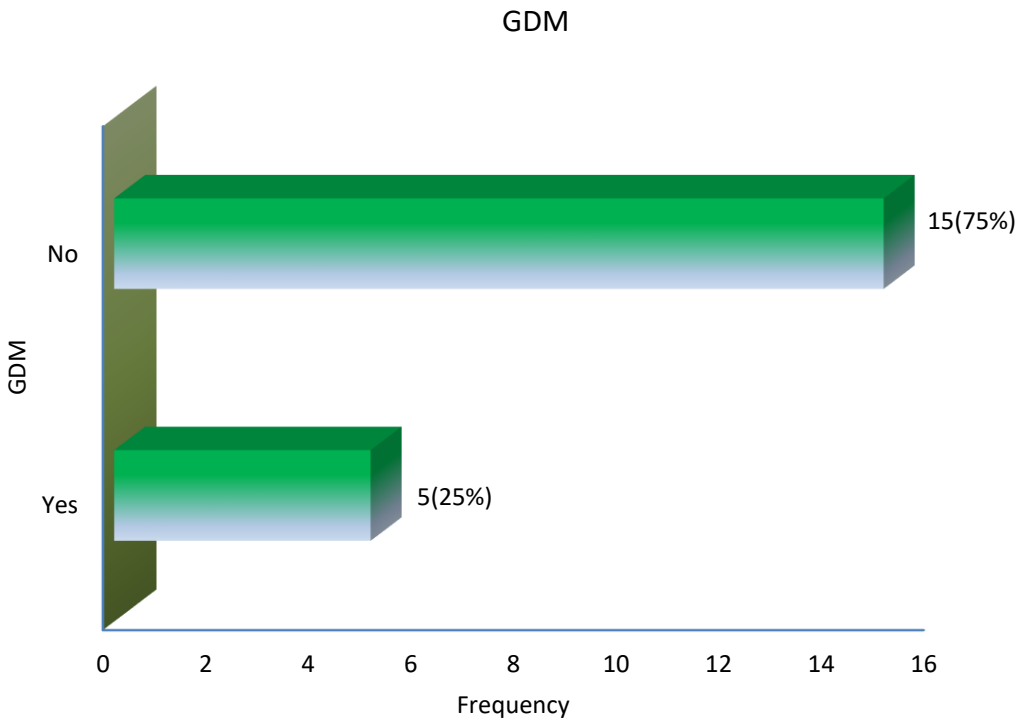
Table 17: Gestational Trophoblastic Disease

GESTATIONAL DIABETES

Among the antenatal women with cardiovascular disease, 25% had Gestational diabetes.

Table 18: Gestational Diabetes

GDM	Frequency	Percent
Yes	5	25
No	15	75
Total	20	100.0



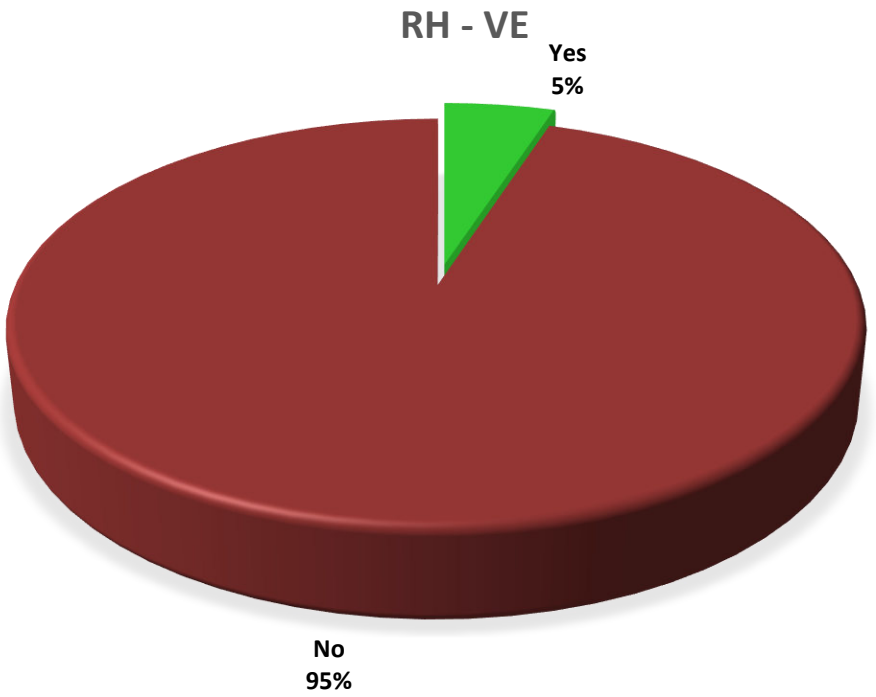
Graph 18: Gestational Diabetes

RHESUS HEMOLYTIC - VE DISEASE

Among the pregnant women with cardiovascular disease, 5% were RH -ve.

Table 19: Rhesus Hemolytic - ve Disease

RH -VE	Frequency	Percent
Yes	1	5
No	19	95
Total	20	100.0



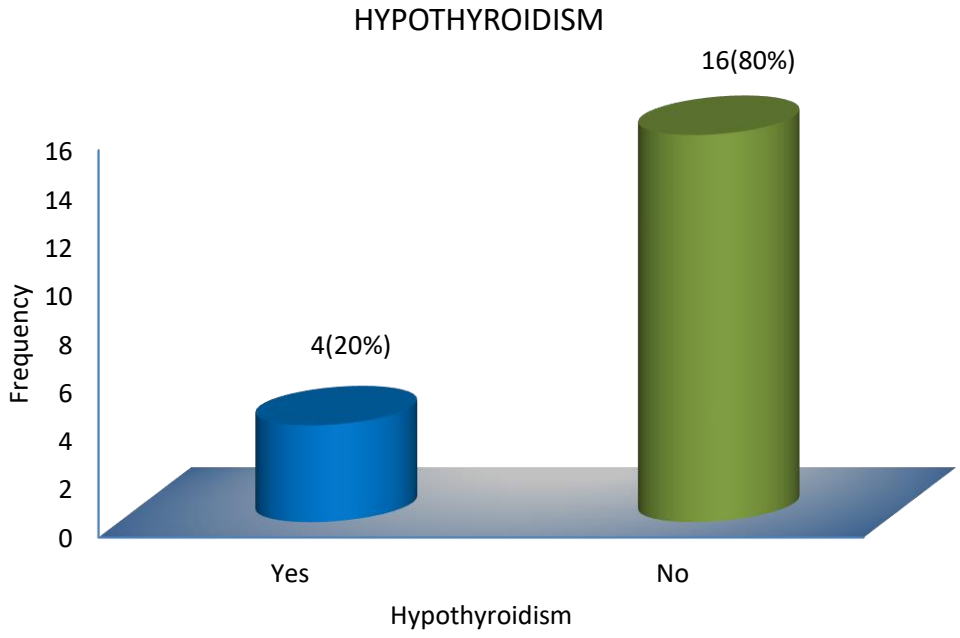
Graph 19: Rhesus Hemolytic - ve Disease

HYPOTHYROIDISM

Among the antenatal women with cardiovascular disease, 20 % had hypothyroidism.

Table 20: Hypothyroidism

Hypothyroidism	Frequency	Percent
Yes	4	20
No	16	80
Total	20	100.0



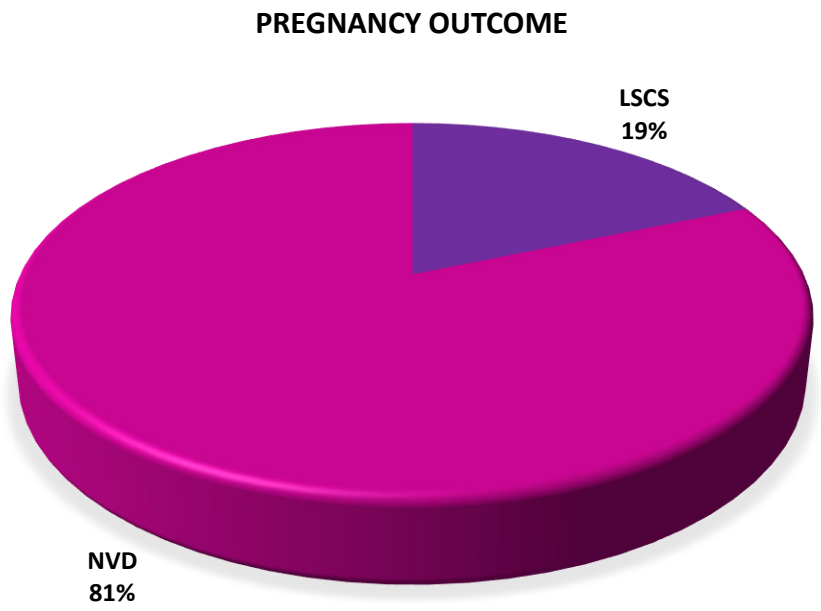
Graph 20: Hypothyroidism

PREGNANCY OUTCOME AMONG ALL PATIENTS

Among the pregnant women, 18.6% underwent lower segment cesarean section and 81.4% had vaginal delivery.

Table 21: Pregnancy Outcome

Pregnancy Outcome	Frequency	Percent
LSCS	13.0	18.6
NVDS	57.0	81.4
Total	70.0	100.0



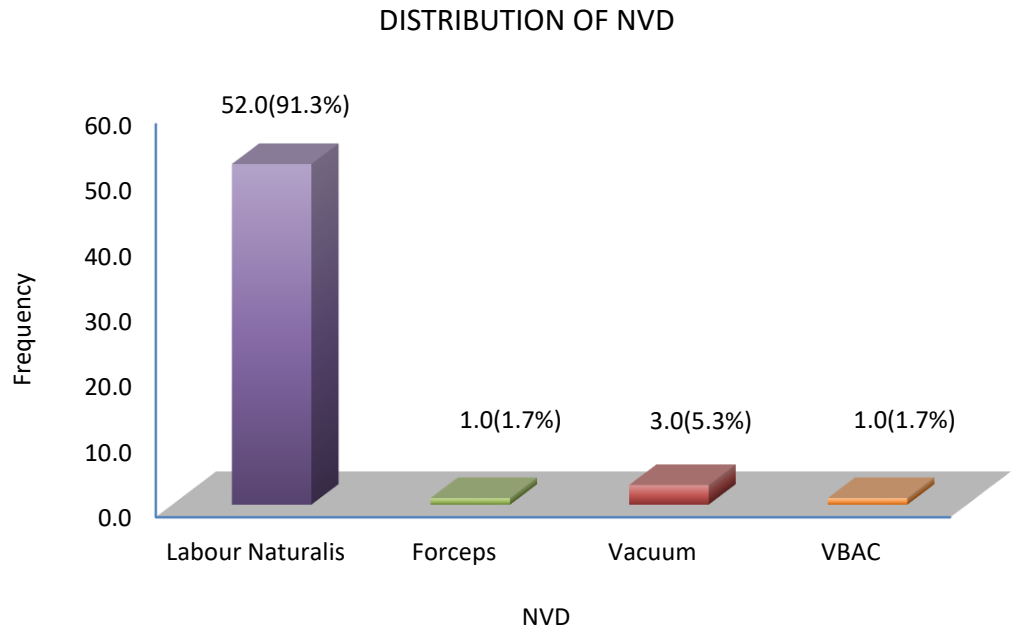
Graph 21: Pregnancy Outcome among all patients

DISTRIBUTION OF NORMAL VAGINAL DELIVARY

Majority of antenatal women with vaginal delivery undergone labour naturalis (91.3%).

Table 22: Distribution of Normal Vaginal Delivary

Distribution of NVD	Frequency	Percent
Labour Naturalis	52.0	91.3
Forceps	1.0	1.7
Vacuum	3.0	5.3
VBAC	1.0	1.7
Total	57.0	100.0



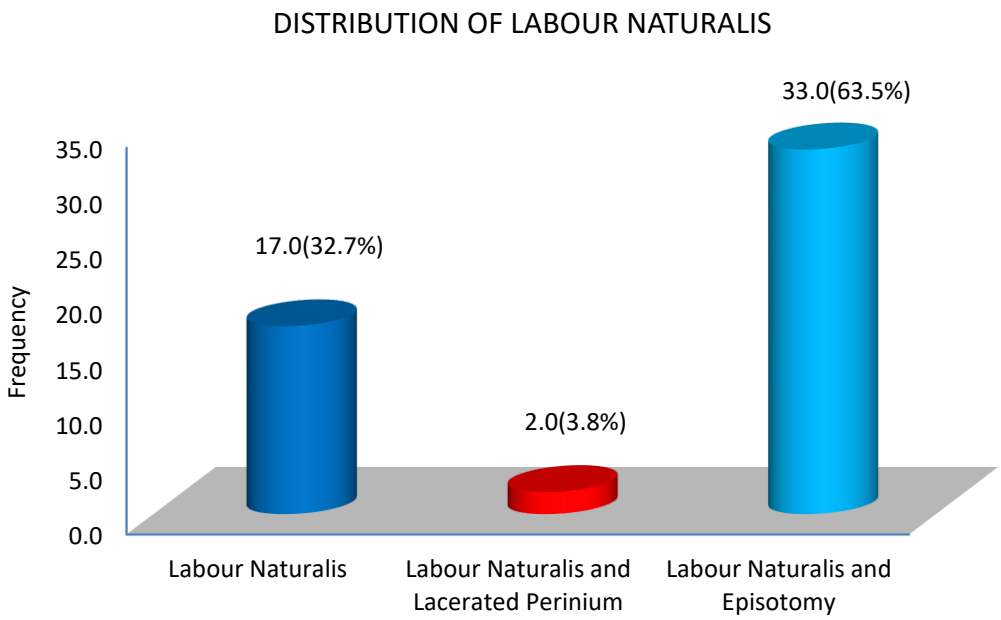
Graph 22: Distribution of Normal Vaginal Delivary

DISTRIBUTION OF LABOUR NATURALIS

Majority of antenatal women with normal vaginal delivery undergone labour natural with episiotomy (63.5%).

Table 23: Distribution of Labour Naturalis

Distribution of Labour Naturalis	Frequency	Percent
Labour Naturalis	17.0	32.7
Labour Naturalis and Lacerated Perineum	2.0	3.8
Labour Naturalis and Episiotomy	33.0	63.5
Total	52.0	100.0



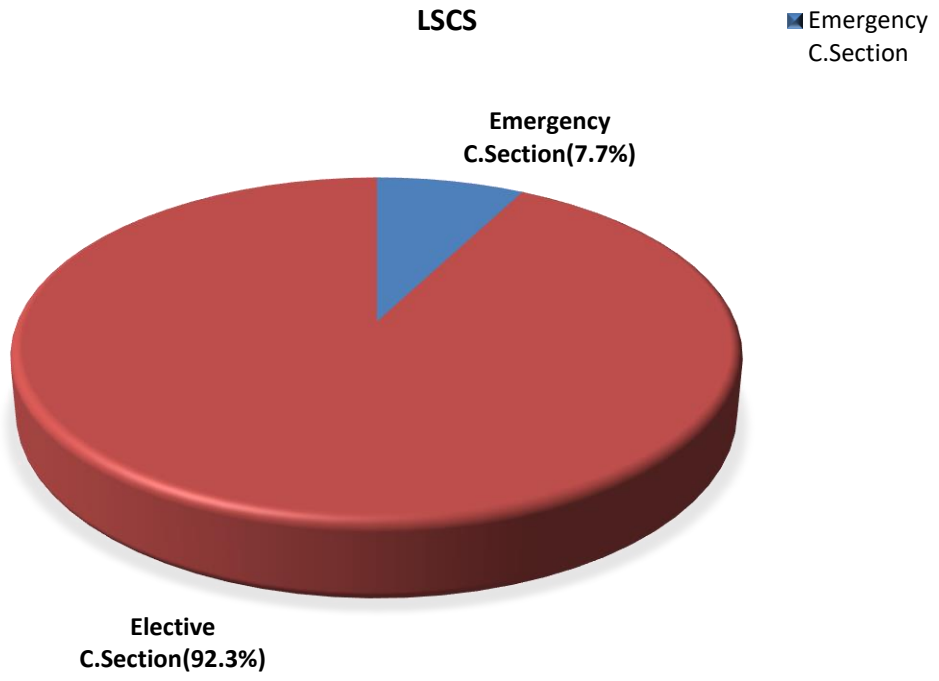
Graph 23: Distribution of Labour Naturalis

LOWER SEGMENT CESAREAN SECTION

Out of 13 patients who underwent cesarean section,12 (92.3%) underwent elective LSCS and 1(7.7%) underwent emergency LSCS delivery.

Table 24: Lower Segment Cesarean Section

LSCS	Frequency	Percent
Emergency C.Section	1.0	7.7
Elective C.Section	12.0	92.3
Total	13.0	100.0



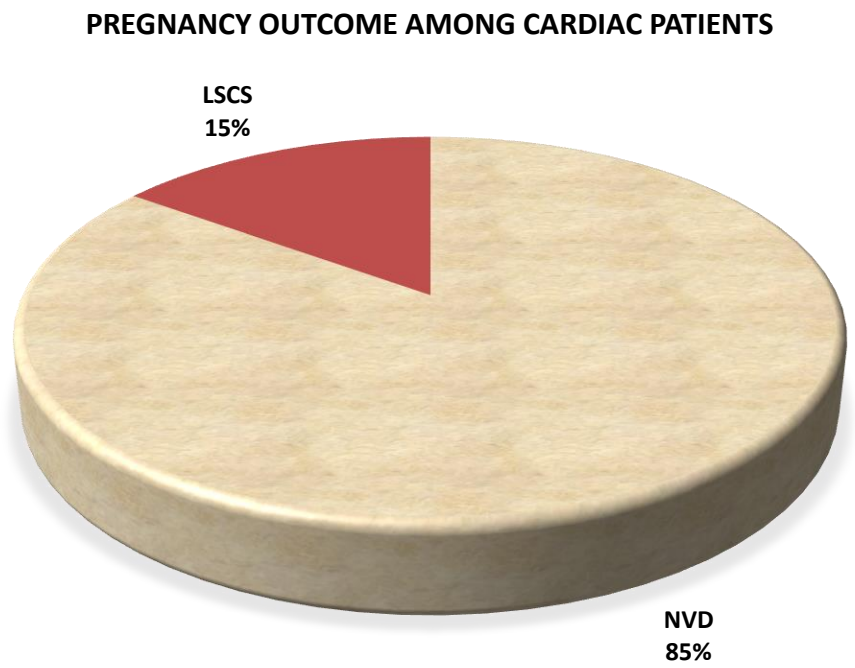
Graph 24: Lower Segment Cesarean Section

PREGNANT OUTCOME AMONG CARDIAC PATIENTS

Among the pregnant women with cardiovascular diseases, 15% underwent lower segment caesarean section. Normal vaginal delivery cases were 85%.

Table 25: Pregnant Outcome Among Cardiac Patients

Pregnancy Outcome	Frequency	Percent
NVD	17.0	85.0
LSCS	3.0	15.0
Total	20.0	100.0



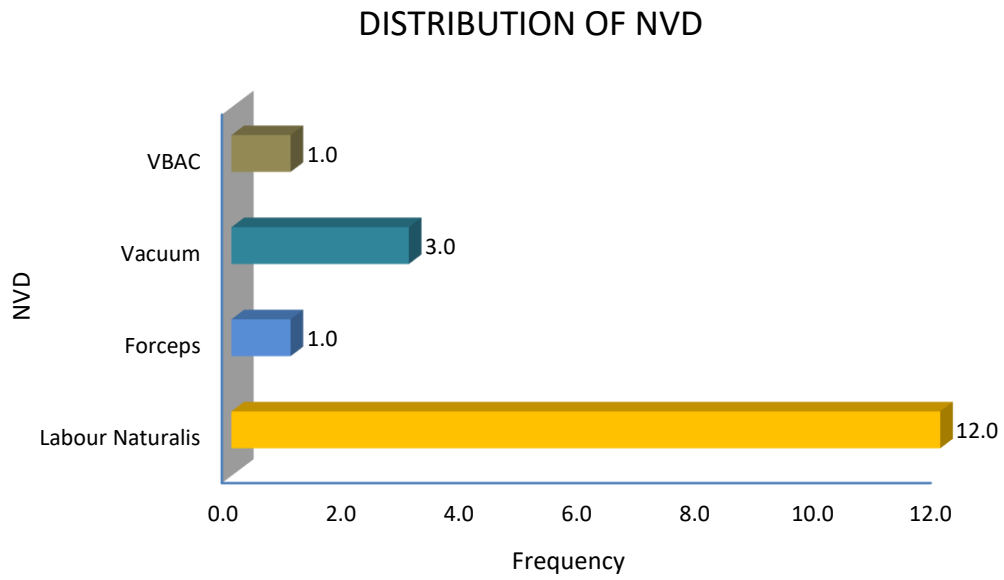
Graph 25: Pregnant Outcome Among Cardiac Patients

DISTRIBUTION OF NORMAL VAGINAL DELIVARY AMONG CARDIAC PATIENTS

Majority of antenatal women with normal vaginal delivery having cardiac disease underwent labour naturalis (70.6%).

Table 26: Distribution of Normal Vaginal Delivary Among Cardiac Patients

Distribution of NVD	Frequency	Percent
Labour Naturalis	12.0	70.6
Forceps	1.0	5.9
Vacuum	3.0	17.6
VBAC	1.0	5.9
Total	17.0	100.0



Graph 26: Distribution of Normal Vaginal Delivary Among Cardiac Patients

DISTRIBUTION OF LABOUR NATURALIS AMONG CARDIAC PATIENTS

58.3% of antenatal women with cardiovascular disease undergone labour natural with episiotomy.

Table 267: Distribution of Labour Naturalis Among Cardiac Patients

Distribution of Labour naturalis	Frequency	Percent
Labour Naturalis	3.0	25.0
Labour Naturalis and Lacerated Perineum	2.0	16.7
Labour Naturalis and Episotomy	7.0	58.3
Total	12.0	100.0

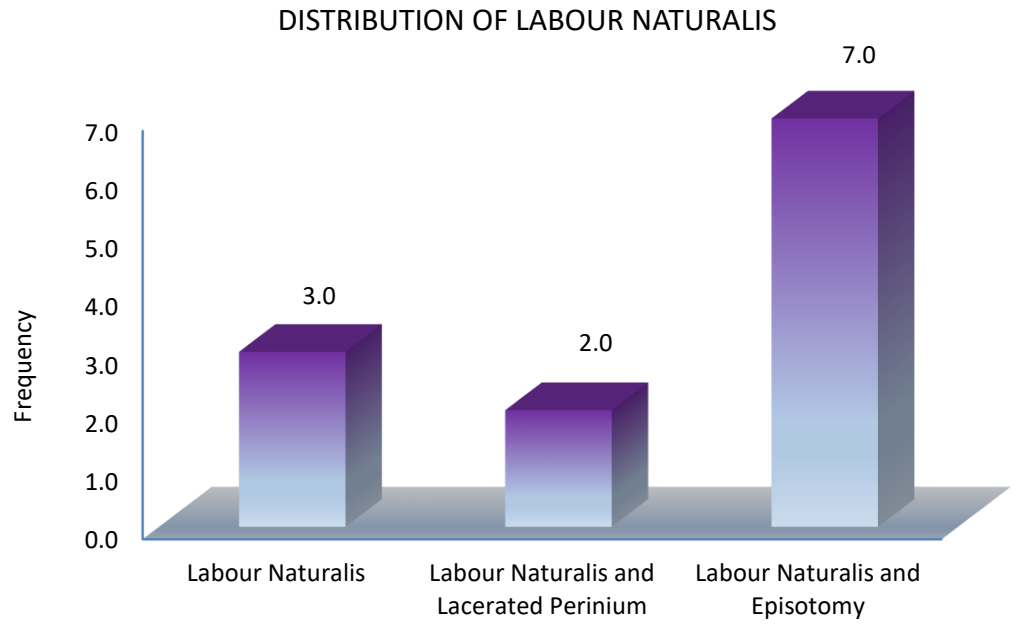


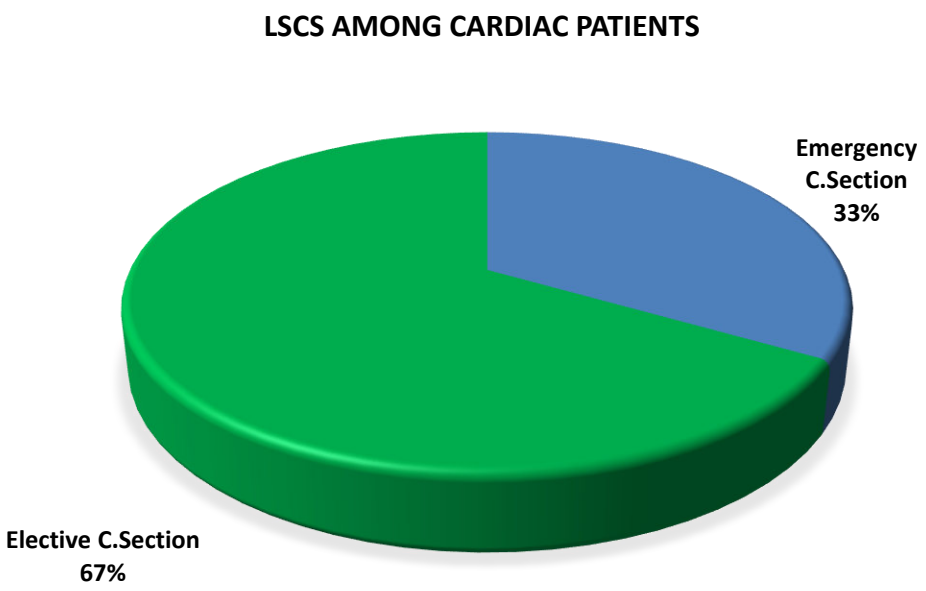
Table 27: Distribution of Labour Naturalis Among Cardiac Patients

LOWER SEGMENT CESAREAN SECTION AMONG CARDIAC PATIENTS

Out of 3 cardiovascular disease complicating pregnancy patients, 2 (66.7%) underwent elective LSCS and 1(33.3%) underwent emergency LSCS.

Table 28: Lower Segment Cesarean Section Among Cardiac Patients

LSCS	Frequency	Percent
Emergency C.Section	1.0	33.3
Elective C.Section	2.0	66.7
Total	3.0	100.0



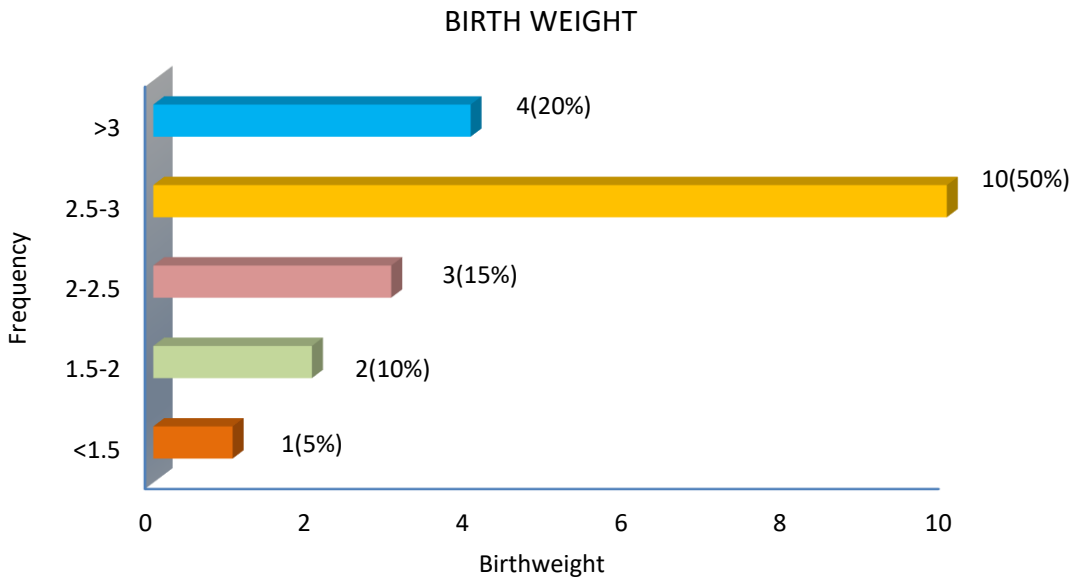
Graph 28: Lower Segment Cesarean Section Among Cardiac Patients

FETAL BIRTH WEIGHT

Half of the fetuses had a birth weight of 2.5 -3 Kg, 10% had a birth weight of 1.5 - 2 Kg, 15% had a birth weight of 2 -2.5 Kg, 20% had a birth weight greater than 3 Kg, while only 5% had a weight less than 1.5 kg.

Table 29: Fetal Birth Weight

Birth Weight	Frequency	Percent
< 1.5	1	5
1.5- 2	2	10
2- 2.5	3	15
2.5- 3	10	50
> 3	4	20
Total	**20**	**100.0**



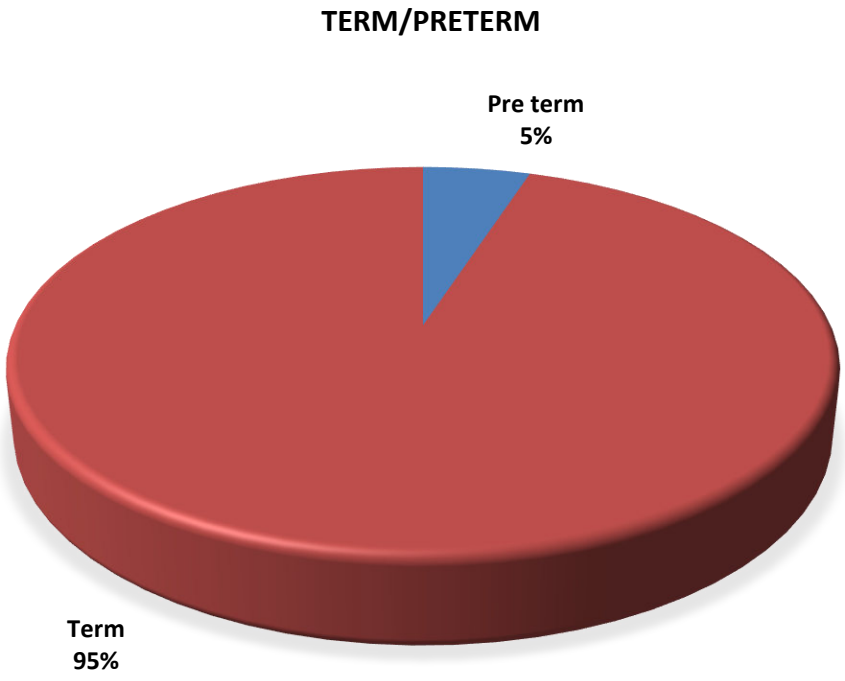
Graph 29: Fetal Birth Weight

TERM/ PRETERM

Among the neonates, 95% were full-term and 5% was found to be pre term neonate.

Table 30: Term/ Preterm

Term/Preterm	Frequency	Percent
Pre term	1	5
Term	19	95
Total	20	100.0



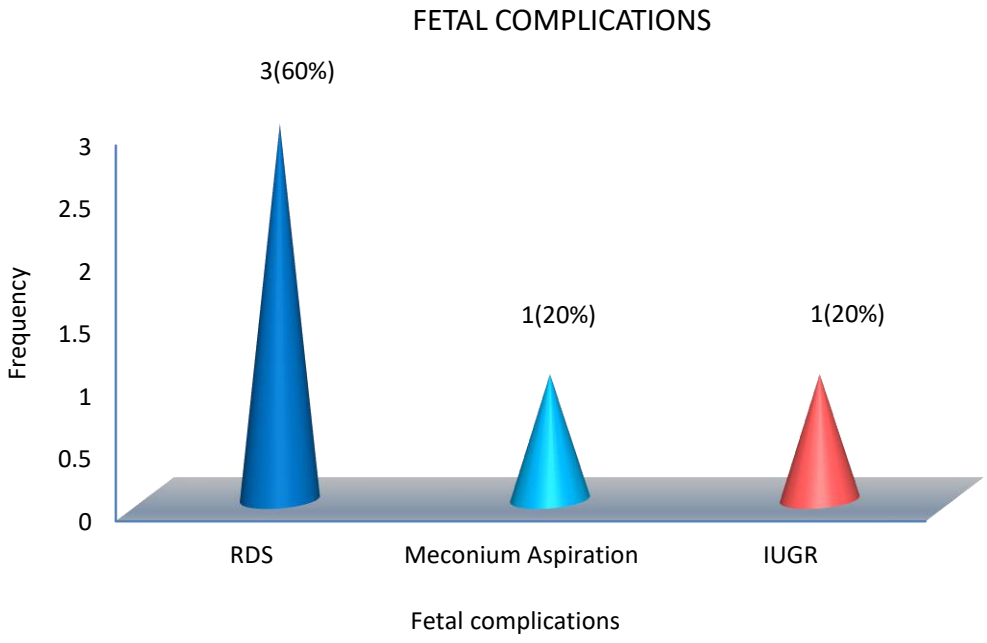
Graph 30: Term/ Preterm

FETAL COMPLICATIONS

Most common complication was neonatal respiratory distress syndrome (60%).

Table 31: Fetal Complications

Fetal Complications	Frequency	Percent
RDS	3	60
Meconium Aspiration	1	20
IUGR	1	20
Total	5	100



Graph 31: Fetal Complications

CONTRACEPTIONS

Among the pregnant women with cardiovascular disease, 85% used copper-T contraception while the remaining (15%) undergone LSCS and sterilization.

Table 32: Contraception

Contraception	Frequency	Percent
Copper -T	17	85
LSCS and Sterilization	3	15
Total	20	100.0

Discussion

The present study was conducted in the SREE MOOKAMBIKA INSTITUTE OF MEDICAL SCIENCES, KULASEKHARAM IN THE DEPT OF OBSTETRICS AND GYNAECOLOGY for a period of 18 months among all the antenatal patients attending

GYN OPD During the study period, total number pregnant patients were 70. Out of which 20 was diagnosed as heart disease complicating pregnancy using echocardiography.

PREVALENCE

- The prevalence of cardiovascular disease among pregnant ladies using echocardiogram was 28.6%.
- Prevalence of heart disease in pregnancy varies from 0.3 to 3.5% in different studies[34]. According to IOSR journal (2015)[35] the prevalence was 0.43%.
- The prevalence is was comparable with studies by Gayathri HA et al (2015)[30] is 1.82 and Indira I et al (2015)[27] is 0.43% Nagamani G et al(2015)[28] is 1.2% , Priya HL et al(2017)[29] is 1.72%, and Selvarani G et al(2017)[31] is 4.7%, and Pujitha KS Et Al(2017)[26] is 0.21%

AGE AND PARITY:

Mudaliar and menon in their study stated that in patients with rheumatic heart disease the cardiac condition worsens with time preferably due to the progressive nature of the organic lesion rather than the increasing parity of the patient.

- In our study, a total of 70 antenatal women were included in the study. Most of them belong to the age group of 25-29 years (40%). Most of the cardiac

patients were below 30years. similar results were obtained in other studies by Nqayana T et al (2008)[32](37.89%) Konar H et al (2012)[25] (43.4%), and Gayathri HA et al (2015)[30] (84%), Priya HL et al (2017)[29] (54.4%), This indicate that in our country early marriage, illiteracy and lack of contraception are quite prevalent mainly responsible for early pregnancy.

- Among the 70 pregnant women, 51(72.9%) were primigravida and 19 (27.1%) were multigravida. Most of the cardiac patients were primi patients. Similar results were obtained in studies by Konar H et al (2012)[25] (G1 44.13%, G2 35.94%), Indira I et al (2015)[35] (G1 42%, G2 32%), and Gayathri HA et al (2015)[30](G1 51%, G2 29 %), and Selvarani G et al (2017)[31] (G1 55.7%, G2 40.5%),

This shows that most patients were primi or second gravida but multigravidity is not uncommon. This indicates lack of awareness as well as understanding of complications and risk associated with heart disease in pregnancy.

SOCIO ECONOMIC STATUS:

Socio economic status has a large influence on patients with cardiac disease. As socio economic class increase there has a negative impact on the heart disease.

Associated medical conditions like anemia, infections, heart failure is more in low socio economic class and hence it complicates the pregnancy in drastic manner affecting both maternal and fetal outcomes.

- Among 70 pregnant women, 26(37.1%) were from Urban area and 44(62.9%) were from rural area.
- Most of the pregnant women belong to the lower middle class (31.45%) and the least belong to the lower class (2.9%).

ANTENATAL CARE:

Booking cases: In our study all patients were booked in our institute. Other results were seen in study by Indira I et al (2015)[27] (Booked 40%, Unbooked 60%) In study by Gayathri HA et al (2015)[30] (Booked 56%, Unbooked 44%) higher percentage of booked patients was seen but unbooked patients were also seen in significant numbers.[30]. and in study Nagamani G. et al (2017)[28] (Booked 48%, Unbooked 52%).

NYHA CLASS:

- Among NYHA functional class, 85% were under NYHA class I followed by NYHA class II (15%). Similar results were seen in other studies by Siu SC et al(2007)[24] (class I and II 96%, class III 4% and class IV 4%) , Konar H et al (2012)[25] (class I and II 83.27%, class III 15.30% and class IV 0.14%), Joshi G et al (class I and II 61.9%, class III 23.8% and class IV 14.3%), and Nqayana T et al(2017)[32] (class I 40%, class II 34.74% class III 16.84%, class IV 8.42%)..
- The prevalence of cardiovascular disease among pregnant ladies using echocardiogram was 28.6%. The prevalence is was comparable with studies by Gayathri HA et al (2015)[30] is 1.82 and Indira I et al (2015)[27] is 0.43% Nagamani G et al (2015)[28] is 1.2%, Priya HL et al (2017)[29] is 1.72%, and Selvarani G et al (2017)[31] is 4.7%, and Pujitha KS et al (2017)[26] is 0.21%

HEART DISEASES:

The most common group of cardiac disease among pregnant women was rheumatic heart disease (65%), 25% had congenital heart disease,5% had MVP and remaining 5% had other viral myocarditis.

According to IOSR journal[35] mitral stenosis was the commonest lesion in the rheumatic heart disease group and atrial septal defect was the commonest among the congenital heart diseases. This was in agreement with the study conducted by Bhatla et al (2003)[36].

The studies published in western countries by Tan and De Swiet in 1998 stated that the incidence of rheumatic heart disease is 12%. Chia in 1998 gave a report that the incidence of rheumatic heart disease is 61.6% and the incidence of congenital heart disease is 38.4%

RHEUMATIC HEART DISEASES:

- Among the pregnant women with rheumatic heart disease, mitral stenosis lesion was found to be 35%. Echocardiography was taken In the parasternal long axis position, the diameters of the aorta, left atrium, and the diastolic and end-systolic diameters of the left ventricle have been measured. The rheumatic involvement of the mitral valve was graded according to the Wilkins scoring system. The mitral, aortic and tricuspid valve insufficiencies were evaluated according to the standard method through Doppler echocardiography. The classification of the MS was based on the calculated mitral valve area (MVA) during the echocardiography. A valve area of ≥1.5 cm2 was classified as mild, an area between 1.5 and 1.0 cm2 as moderate and <1.0 cm2 was classified as severe

- Among the pregnant women with rheumatic heart disease, the frequency of mitral regurgitation was 10%. In women of child bearing years mitral regurgitation is most commonly due to mitral valve prolapse or acquired rheumatic heart disease and rarely due to acute endocarditis. Chronic mitral regurgitation, even if severe, is well tolerated in pregnancy if the patient has good left ventricular systolic function and is symptomatic. The decreased systemic vascular resistance and systolic blood pressure are hemodynamically favourable for patients with mitral regurgitation.

- Among the pregnant women with rheumatic heart disease, 15% had both mitral stenosis lesion and mitral regurgitation.

- Among the pregnant women with rheumatic heart disease, 5 % had atrial regurgitation. Reguritant lesion are well tolerated compared to stenotic lessions. The diagnosis of these lesions is very important in management of these patients during labour and delivery. The use of intravenous fluids mitral stenosis has to be restricted whereas in case of aortic stenosis, patient is managed by the use of intravenous fluids

- Among the pregnant women with congenital heart disease, 15% had Atrial septal defect. According to Konar et al[80] (2012) study the atrial septal defect was found to be in 15 % of the cases which is similar to our study

- Among the pregnant women with congenital heart disease, 5% had ventricular septal defect.

- According to Konar et al [80] (2012) study, the ventricular septal defect was found to be 12% (20)

- Among the pregnant women with congenital heart disease, 5% had Patent ductus arteriosus. According to Konar et al[80] (2012) study, the patent ductus arteriosus was found to be in 7% (11.7)
- Among the pregnant women with cardiovascular disease, 5% had mitral valve prolapse.
- According to Konar et al[80] (2012) study, the patent ductus arteriosus was found to be in 7% (11.7)

MEDICAL CONDITIONS:

- Among the pregnant women with cardiovascular disease, 35% were anemic patients.25% were gestational diabetes mellitus, 15%were RH negative patients and 20% are hypothyroidism.
- In studies by Konar H et al (2012)[25] (Preeclmpsia 1.42%) and Priya HL et al (2017)[29] (Gestational hypertension 2.7%, preeclampsia 2.7%, moderate anemia 4.1%, hypothyroidism 2.7%) comparatively low proportion of hypertensive disorders were seen while in study by Nqayana T et al (2017)[32] (Anemia 13.68%) comparatively higher incidence of anaemia was seen.
- Among the pregnant women, 18.6% underwent lower segment caesarean section and 81.4% had normal vaginal delivery.
- While in studies by Siu SC et al (2007)[24](VD 73%, LSCS 27%), Konar H et al (2012)[25](SVD 46.6%, Induced 3.2% LSCS 33%) and Priya HL et al (2017)[29] (VD 70%, LSCS 30%) similar results were seen. But in study by Indira I et al (2015)[27](VD 53.33%, LSCS 3.33% Forceps 26.66%) comparatively low proportion of caesarean section were seen probably due to increased rate of forceps deliveries.

- Majority of antenatal women with normal vaginal delivery having cardiac disease underwent labour naturalis (70.6%).
- 58.3% of antenatal women with cardiovascular disease undergone labour natural with episiotomy.
- Out of 3 cardiovascular disease complicating pregnancy patients ,2 (66.7%) underwent elective LSCS and 1(33.3%) underwent emergency LSCS due to obstetric reasons.

MATURITY OF THE BABY:

Among the neonates, 95% were full-term and 5% was found to be pre term neonate. Half of the fetuses had a birth weight of 2.5 - 3 Kg, 10% had a birth weight of 1.5 - 2 Kg, 15% had a birth weight of 2 - 2.5 Kg, 20% had a birth weight greater than 3 Kg, while only 5% had a weight less than 1.5 kg.

FETAL COMPLICATIONS:

Most common complication was neonatal respiratory distress syndrome (60%). According to MEHTA LR etal 2017[78} study 74% babies were healthy while IUGR and intrauterine deaths were seen in 22% cases and 4% cases respectively.

According to DINA AISHA KHAN etal 2018 [79] The foetal outcome (live birth) was bad in cases. Low birth weight was higher among the cases WHEN COMPARED TO CONTROLS (34.61% babies among cases and 12.73% babies among controls).

CONTRACEPTION:

Among the pregnant women with cardiovascular disease, 85% used copper-T contraception while the remaining (15%) undergone LSCS and sterilization.

In this study, the patients who were diagnosed to have cardiac disease were classified according to NYHA class and was treated accordingly

Pregnancy in a mother suffering from cardiovascular disease causes significant changes in cardiovascular and hemodynamic health, which may result in obstetric and neonatal complications.

Furthermore, in this study, overall, RHD was much more common than CHD, which is similar to the study conducted in Vietnam

And most of the studies discussed above mitral valve stenosis were found to be the most common similar to our study.

In other studies patients most of them complaints of breathlessness, palpitation, chest pain, leg edema, but in our study no patients had such complaints and the heart disease was diagnosed only during the antenatal period.

Pregnant ladies with heart disease will experience burden to the heart. In our study no antenatal patients had complications unlikely to other studies above, were some mothers experienced heart failure, arrhythimia, pulmonary edema

In our study the fetal outcomes was full term live birth without any complication. In most studies the most common fetal complications are intrauterine growth restriction

Summary

The present study was conducted in the SREE MOOKAMBIKA INSTITUTE OF MEDICAL SCIENCES, KULASEKHARAM, IN THE DEPT OF OBSTETRICS AND GYNAECOLOGY for a period of 18 months among the antenatal patients with heart disease. During the study period, total number pregnant patients were 70. Out of which 20 was diagnosed as heart disease complicating pregnancy using echocardiography. After approval of the study protocol by our institutional Research committee and Human Ethical committee, written informed consent was taken from pregnant women attending Obstetrics and Gynaecology out Patient department, Sree Mookambika Institute of Medical Science Kulasekharam, who fulfill the inclusion and exclusion criteria. Total 70 women was included in the study.

A detailed history was taken which included the patient's education, occupation, socio-economic status, menstrual history, obstetric history, past medical and surgical history and personal history. A thorough general physical examination was done. Vitals signs and all systems was examined.

All women were subjected to routine antenatal tests and Electrocardiography and Echocardiography (ECHO). Based on the symptoms all the patients were classified according to New NYHA functional classification. Patients were advised to have regular antenatal check-up thereafter.

- ✓ All antenatal mothers were screened using Echocardiogrpahy
- ✓ The prevalence of cardiovascular disease was 28.6%.
- ✓ The most common lesion was rheumatic heart disease (mitral stenosis).
- ✓ 85% were in NYHA class 1
- ✓ 81.4% underwent normal vaginal delivery.

Limitations

LIMITATIONS OF THE STUDY:

- The Sample Size is Small
- Hypertensive Patients are not Included

Conclusion

Heart disease in pregnancy continues to be the major cause of maternal mortality, preterm birth and perinatal mortality.

Early termination of pregnancy and prompt use of permanent sterilization methods improve the survival of women with high risk cardiac disease.

Pregnancy in women with heart disease continues to be associated with significant morbidity, although mortality is low/rare. Arrhythmia and heart failure are the most common maternal cardiac complications, but there has been reduction in the pulmonary edema over period of time. Prediction of maternal cardiac complication in women with heart disease requires integration of clinical information, echocardiographic parameters, the specific maternal cardiac lessions and process of care variables. Careful cardiovascular clinical assessment remains the foundation of risk stratification of pregnant women with heart disease.[4]

In the present study, we felt that routine examination by auscultation should be there to identify the cardiac lesions. If there is any doubt on any cardiac lessions, the patient should be referred to cardiologist immediately for confirmation.

Likewise general physician should always make cardiac auscultation on any girl or women attending OPD so that future long term complications related to pregnancy can be avoided and pregnancy can be well tolertaed.

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Appendices

APPENDIX - I

SREE MOOKAMBIKA INSTITUTE OF MEDICAL SCIENCES

KULASEKHARAM

RESEARCH COMMITTEE

CERTIFICATE

This is to certify that The Research Protocol Submitted by NEHA HARIDAS

~~Faculty~~ / Post Graduate from Department of OBSTETRICS AND GYNAECOLOGY *Titled* A PROSPECTIVE OBSERVATIONAL STUDY ON CARDIOVASCULAR DISEASES AMONG PREGNANT LADIES USING ECHOCARDIOGRAPHY IN TERTIARY CARE CENTRE IN KANYAKUMARI DISTRICT

is approved by the Research Committee.

Chair Person

Prof. & H.O.D.
Dept. of Bio Chemistry
Sree Mookambika Institute of Medical Sciences
Kulasekharam 629 161

Convenor

Dr. P.S. Krishna Murthy.
M.D.S., M.D
Prof. & H.O.D.
Dept of Physiology
Sree Mookambika Institute of Medical Sciences
Kulasekharam 629 161

Date : 9-12-19

APPENDIX - II

INSTITUTIONAL HUMAN ETHICS COMMITTEE

SREE MOOKAMBIKA INSTITUTE OF MEDICAL SCIENCES,
KULASEKHARAM, TAMILNADU

Communication of Decision of the Institutional Human Ethics Committee(IHEC)

SMIMS/IHEC No: 1 / Protocol no: 43 / 2019

Protocol title: A PROSPECTIVE OBSERVATIONAL STUDY ON CARDIOVASCULAR DISEASES AMONG PREGNANT LADIES USING ECHOCARDIOGRAPHY IN TERTIARY CARE CENTER IN KANYAKUMARI DISTRICT
Principal Investigator: Dr.Neha Haridas
Name& Address of Institution: Department of Obstetrics and Gynaecology Sree Mookambika Institute of Medical Sciences,Kulasekharam ☑ New review ☐ Revised review ☐ Expedited review
Date of review (D/M/Y): 28-12-2019 Date of previous review , if revised application:
Decision of the IHEC: ☑ Recommended ☐ Recommended with suggestions ☐ Revision ☐ Rejected
Suggestions/ Reasons/ Remarks:
Recommended for a period of :Eighteen months

Please note*

- Inform IHEC immediately in case of any Adverse events and Serious adverse events.
- Inform IHEC in case of any change of study procedure, site and investigator
- This permission is only for period mentioned above.
- Annual report to be submitted to IHEC.
- Members of IHEC have right to monitor the trial with prior intimation.

Signature of Chair person (IHEC)

Signature of Member Secretary (IHEC)

30/12/19

APPENDIX - III

CONSENT FORM

PART 1 OF 2

INFORMATION FOR PARTICIPANTS OF THE STUDY

Dear Participants,

We welcome you and thank you for your keen interest and participation in this research project. Before you participate in this study it is important for you to understand why this research is being carried out. This form will provide you all the relevant details of this research. It will explain the nature, purpose, the benefits, the risks, the discomforts, the precautions, and the information about how this project will be carried out. It is important that you read and understand the contents of the form carefully. This form may contain certain scientific terms and hence if you have any doubts or if you want more information, you are free to ask the study personnel or the contact person mentioned below before you give your consent and also at any time during the entire course of the project.

1. Name of the principal investigator : **Dr. NEHA HARIDAS**
Post graduate student
Department of Obstetrics and Gynaecology
Sree Mookambika Institute of Medical Science,
Kulasekharam.

2. **Name of the Guide** : **Dr. JESUTHANGAM, M.D, DGO**
Professor
Obstetrics & Gynaecology
Sree Mookambika Institute of Medical Science,
Kulasekharam.

3.Name of the Co-Guides : **Dr. JAMEELA PONMALAR MS, DGO**
Associate Professor
Department of OBG
SMIMS, Kulasekharam,

: **Dr. B. VENKATESH BABU MD;**
DM (cardiology)
Senior Interventional Cardiologist
Dept of cardiology, SMIMS,kulashekaram

4. Institute and Place: Sree Mookambika Institute of Medical Sciences, Kulasekharam.

5.Title of the study: A PROSPECTIVE OBSERVATIONAL STUDY ON CARDIOVASCULAR DISEASES AMONG PREGNANT LADIES USING ECHOCARDIOGRAPHY IN TERTIARY CARE CENTER IN KANYAKUMARI DISTRICT.

6. Background information: One of the advantages of echocardiographic monitoring during pregnancy is the avoidance of exposure to ionizing radiation. Echocardiography is a safe and noninvasive evaluation test will probably remain for long time as a cornerstone in diagnosis, assessment of disease severity and patient monitoring in pregnant women who

strongly wish to become mother. Cardiac diseases complicate 2% of pregnancies in developing countries like India. It contributes to one–fifths of all maternal deaths.

Maternal heart disease can lead to cardiac decompensation and death, particularly in the second stage of labour. In addition, co-morbidities such as pre-eclampsia, anaemia, preterm labour and foetal growth restriction are commonly seen in patients with heart disease. Therefore, patients should be evaluated for underlying cardiac disease to select appropriate management.

7. Aims and objectives:

- To find out the prevalence of cardiovascular disease among pregnant ladies using echocardiogram
- To assess the risk for cardiac events in diagnosed cardiac patients.
- To study the outcome of pregnancy among cardiovascular patients.

8. Scientific justification of the study:

Prevalence of heart diseases in pregnancy are found to be between 0.3-3.5%. Heart diseases are now the leading cause of indirect maternal deaths accounting for 20.5%. Echocardiography provides information about disease etiology, leads to accurate assessment of disease severity and is a powerful means of monitoring progression. Only with echocardiography it has been clearly demonstrated that during pregnancy congenital heart disease is the first leading abnormality followed by rheumatic heart disease.It also illuminates the necessity of monitoring throughout pregnancy and labor, and leads to determine whether surgical or medical intervention should be performed.

9. Procedure of the study:

After approval of the study protocol by our institutional Research committee and Human Ethical committee, written informedconsent will be taken from pregnant women attending Obstetrics and Gynaecology out department, Sree Mookambika Institute of Medical Science Kulasekharam, who fulfill the inclusion and exclusion criteria. Total 100 women will be included in the study. A detailed history will be taken which will include the patient's education, occupation, socio-economic status, menstrual history, obstetric history, past medical and surgical history and personal history. A thorough general physical examination will be done. Vitals signs and all systems will be examined. All women will be subjected to routine antenatal tests and Echocardiogram and Electrocardiogram (ECG). Based on the symptoms all the patients will be classified according to New NYHA functional classification. Patients will be advised to have regular antenatal check-up thereafter. The mode of delivery and complications will be documented. Maternal complications includes anemia, maternal death which can be due to acute pulmonary edema, infective endocarditis, congestive cardiac failure pulmonary hypertension, arrhythmias.Fetal complications includes spontaneous miscarriage, preterm labour, fetal growth restriction.

10. Expected risks for the participants: no risk

11. Expected benefits of research for the participants: This study helps to improve the pregnancy outcome and decrease perinatal morbidity and mortality. This study will also be beneficial for the betterment of the Health Sector in Kanyakumari district of Tamil Nadu.

12. Maintenance of confidentiality: Yes

13. Why have I been chosen to be in the study?

You have been chosen to be a part of this study because you are a pregnant woman who has presented to the Obstetrics department for delivery.

14. How many patients will be in the study? 70

15. Agreement of compensation to the participants (in case of a study related injury): Not applicable

16. Anticipate prorated payment, if any to the participants of the study? Not applicable

17. Can I withdraw from the study, at any time during the study period? Yes

18. If there is any new findings / information, would I be informed? Yes

19. Expected duration of the participant's participation in the study: Till the delivery of the baby

20. Any other pertinent information? Nil

21. Whom do I contact for further information?

For any study related queries you are free to contact:

NEHA HARIDAS
Post Graduate - M. S. (Obstetrics and Gynaecology),
Department of Obstetrics and Gynaecology,
Sree Mookambika Institute of Medical Sciences,
Kulasekharam
Mobile number: 9894965076
Email. id: nehaharidas0@gmail.com

Place: Kulasekharam

Date:

Signature of Principal investigator **Signature of Participant**

PART - 2 OF 2

PARTICIPANTS CONSENT FORM

The details of the study have been explained to me in writing and the details have been fully explained to me. I am aware that the results of the study may not be directly beneficial to me but will help in the advancement of medical sciences. I confirm that I have understood the study and had the opportunity to ask questions. I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without the medical care that will normally be provided by the hospital being affected. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s). I have been given an information sheet giving details of the study. I fully consent to participate in the study titled

Serial no/ Reference no:

Name of Participant:

Contact No:

Signature of the Participant

Witness

1.

2.

Date :

Place : Kulasekharam

APPENDIX - IV

CASE RECORD FORM

Name: …….. OP No.: ……
Age : ……. Contact number:……..
Address: …….

Demographic Data

Name: IP no:
Age: Address:
Education:

i) Illiterate ☐ ii) Primary education ☐ iii) Pre degree ☐
iv) Graduate ☐ v) Postgraduate ☐

Occupation:
Socio Economic Status:
LMP: ……. EDC: ……..……

1. MENSTRUAL HISTORY:

a. Duration of cycle : i)<21 ii)21-35 iii)>35
b. Number of pads changed/day : i)<=3 ii)4-7 iii)8-10 iv)>10
c. Passage of clots : yes/no

2. MARITAL HISTORY :

Married life…… Consanguinous marriage…..

non consanguinous marriage….. Infertility treated……..

3. PAST OBSTETRIC HISTORY:

Obstetric Score: G ☐ P ☐ L ☐ A ☐

Antenatal period …….. .
Intranatal period ……..
Postnatal period ……
Mode of delivery:
i)Normal vaginal ☐ ii) Vaccum/forceps ☐ iii) Caesarean ☐

Spacing between deliveries: i)<2 years ii)>=2years
Last child birth …….
H/o antepartum hemorrhage : Yes/No
H/o postpartum hemorrhage: yes/no
H/o pregnancy induced hypertension
H/o gestational diabetes
H/o PROM
H/o Preterm labour
H/o previous LSCS
H/o IUD, still birth
Any medical condition : _ _
If any, specify .....
Low Birth weight : _ _
birth weight of previous babies: i)<2.5kg ii)2.5-3.5kg iii)>3.5kg

4. **PRESENT OBSTETRIC HISTORY** [01- Present 02- Absent]

Anaemia	:	
IUGR	:	
PIH	:	
Preeclampsia	:	
Oligohydramnios	:	
APH	:	
Rh isoimmunisation	:	
GDM	:	
Renal Disease	:	
Thyroid Disease	:	
Any medical condition	:	If any, specify .....
Chronic hypertension	:	

5. PAST HISTORY

Diabetes mellitus	□	Hypertension	□	Tuberculosis	□
Bronchial asthma	□	Thyroid disorder	□	Surgery	□
Hospitalization	□	Immunocompromised	□		

6. FAMILY HISTORY

Diabetes mellitus	□	Thyroid disorder	□
Hypertension	□		
Tuberculosis	□	Bronchial asthma	□

7. PERSONAL HISTORY

Diet:	Veg	□	Mixed	□		
Sleep:	Adequate	□	Inadequate	□		
Appetite:	Increased	□	Good	□	Decreased	□

Bowel and bladder habits:

Addictions : ……

EXAMINATION OF THE PATIENT:

Height : …….cm Weight : ……Kg BMI: …..…kg/m^2

Pallor	Present	□	Absent	□
Icterus	Present	□	Absent	□
Cyanosis	Present	□	Absent	□
Clubbing	Present	□	Absent	□
Lympahadenopathy	Present	□	Absent	□
Pedal edema	Present	□	Absent	□

Breast …… Spine …… Thyroid ……

Temp: …….°F Pulse: ……/min BP: …….….mmHg

CVS …… RS …..…… CNS …….

P/A Symphysio Fundal height …… Presentation …….

FH ……/min Abdominal Girth:……..

P/V: ……..

INVESTIGATIONS:

1. Complete Hemogram:
2. TLC, DLC
3. Urine routine – albumin,sugar,deposits
4. Renal function test
5. Thyroid function test
6. Liver enzymes
7. Viral markers
8. GTT
9. Echocardiography
10. Electrocardiography
11. Chest x ray
12. USG
13. CARDIOLOGIST OPINION(if specified)

PERINATAL OUTCOME

- Date of Delivery : ...../...../201.....
- Gestational age at delivery : ..... weeks ..... day/s
- Birth weight : ..... gms
- IUGR [01- Present 02- Absent] : _ _
- Mode of Delivery : _ _ [01- Normal vaginal 02- Instrumental
  03 Emergency LSCS 04 Elective LSCS]
- SGA [01 – Present 02 - Absent]: _ _
- APGAR score: .....
- Neonatal complications : _ _ [01 – Present 02 - Absent]
- If present, specify .....

Date: **Signature**

APPENDIX - V

MASTER CHART

S.NO	AGE	PARITY	URBAN	RURAL	NYHA CL	HEART D	RHD MS	MR	MS+MR	AR	CHD ASD	VSD	PDA	MVP/ MR	ANEMIA	GHT	GDM	RH-VE	HYPOTYR	NVD	LSCS	BIRTH WE	TERM/PRE	CONTRAC	SE CLASS
1	1	G2	yes		class1	RHD	yes	No	No	No	yes	No	No	No	yes	No	No	No	yes		EMER	<1.5	term	ster	class 1
2	2	P		yes	class1	MVP	No	yes	No	No	No	yes	No	No	No	yes	No	No	No	LN		2.5-3	preterm	cu t	class 1
3	4	P		yes	class1	CHD	No	yes	No	No	No	No	yes	No	No	No	yes	No	No	LN LP		>3	term	cu t	class 2
4	3	P	yes		class1	RHD	yes	No	No	No	yes	No	No	No	No	No	No	yes	No	LN		1.5-2	term	cu t	class 3
5	3	P		yes	class1	CHD	yes	No	No	No	yes	No	No	No	No	yes	No	No	No	VACUUM		2-2.5	term	cu t	class 2
6	2	P		yes	class1	CHD	yes	No	No	No	No	No	No	yes	No	No	yes	No	No	VACUUM		2.5-3	term	cu t	class3
7	3	G2	yes		class1	RHD	yes	No	No	No	No	No	No	No	No	No	yes	No	No		elective	1.5-2	term	lscs ster	class3
8	3	P		yes	class1	RHD	yes	No	No	No	No	No	No	No	yes	No	No	No	No	VACCUM		2.5-3	term	cu t	class3
9	3	P		yes	class1	CHD	yes	No	No	No	No	No	No	No	No	No	No	No	yes	LN		2-2.5	term	cu t	class4
10	3	P		yes	class1	CHD	No	No	yes	No	No	No	No	No	No	yes	No	No	No	VBAC		2.5-3	term	cu t	class 4
11	3	P	yes		class1	RHD	No	No	No	yes	No	No	No	No	No	No	yes	No	No	FORCEP		2-2.5	term	cu t	class4
12	3	G4		yes	class1	RHD	No	No	yes	No	No	No	No	No	yes	No	No	No	No	No	elective	>3	term	lscs ster	class 4
13	3	p		yes	class1	RHD	No	No	yes	No	No	No	No	No	yes	No	No	No	No	LNE		>3	term	cu t	class3
14	4	P		yes	class1	RHD	No	No	No	No	No	No	No	No	yes	No	No	No	No	LNE		>3	term	cu t	class4
15	3	P	yes		class2	RHD	No	No	No	No	No	No	No	No	No	No	yes	No	No	LNE		2.5-3	term	cu t	class4
16	3	P		yes	class 1	RHD	No	No	No	No	No	No	No	No	No	No	No	No	yes	LNLP		2.5-3	term	cu t	class3
17	3	P		yes	class 1	RHD	No	No	No	No	No	No	No	No	yes	No	No	No	No	LNE		2.5-3	term	cu t	class4
18	3	P		yes	class 2	RHD	No	No	No	No	No	No	No	No	yes	No	No	No	No	LNE		2.5-3	term	cu t	class4
19	3	P		yes	class 1	RHD	No	No	No	No	No	No	No	No	No	No	No	No	yes	LNE		2.5-3	term	cu t	class4
20	5	P		yes	class 2	others viral myocarditis	No	No	No	No	No	No	No	No	No	No	No	No	No	LNE		2.5-3	term	cu t	class3

21	3	g2	yes				No	No	No	No	No	No	No	No	yes	No	No	No	No		elective	2-2.5	term	lscs ster	class 2
22	3	g3		yes			No	No	No	No	No	No	No	No	No	yes	No	No	No		elective	2-2.5	term	lscs ster	class3
23	3	p		yes			No	No	No	No	No	No	No	No	No	yes	No	No	No	LNE		2-2.5	term	cu t	class3
24	3	p	yes				No	No	No	No	No	No	No	No	No	No	yes	No	No	LNE		2.5-3	term	cu t	class2
25	4	p	yes				No	No	No	No	No	No	No	No	No	No	yes	yes	No	LNE		1.5-2	term	cu t	class2
26	1	g2		yes			No	No	No	No	No	No	No	No	yes	No		No	No		elective	2-2.5	term	lscs ster	class3
27	5	p		yes			No	No	No	No	No	No	No	No	No	yes	No	No	No	LNE		2.5-3	term	cu t	class3
28	3	p		yes			No	No	No	No	No	No	No	No	No	No	No	yes	No	LNE		1.5-2	term	cu t	class4
29	4	p		yes			No	No	No	No	No	No	No	No	No	No	yes	No	yes	LNE		1.5-2	term	cu t	class 2
30	5	g4	yes				No	No	No	No	No	No	No	No	No	yes	No	No	No	No	elective	1.5-2	term	LSCSST	class 1
31	5	g4		yes			No	No	No	No	No	No	No	No	No	No	No	yes	No	No	elective	2-2.5	term	LSCS STR	class1
32	3	p		yes			No	No	No	No	No	No	No	No	yes	No	No	No	No	LNE		2-2.5	term	cu t	class2
33	5	p	yes				No	No	No	No	No	No	No	No	No	yes	No	No	yes	LNE		2.5-3	term	cu t	class2
34	4	p		yes			No	No	No	No	No	No	No	No	yes	No	No	No	No	LNE		1.5-2	term	cu t	class3
35	5	g3		yes			No	No	No	No	No	No	No	No	No	No	yes	No	No	LNE		2-2.5	term	cu t	class2
36	4	p	yes				No	No	No	No	No	No	No	No	No	No	No	yes	No	LNE		2.5-3	term	cu t	class2
37	2	p		yes			No	No	No	No	No	No	No	No	No	No	yes	No	No	LNE		1.5-2	term	cu t	class3
38	3	g2	yes				No	No	No	No	No	No	No	No	yes	yes	No	No	No	LNE		2-2.5	term	cu t	class 2
39	4	p		yes			No	No	No	No	No	No	No	No	No	No	No	No	yes	LNE		2.5-3	term	cu t	class2
40	3	p		yes			No	No	No	No	No	No	No	No	No	No	No	No	No	LNE		2-2.5	term	cu t	class3
41	2	p		yes			No	No	No	No	No	No	No	No	No	No	No	No	No	LNE		1.5-2	term	cu t	class1
42	4	p	yes				No	No	No	No	No	No	No	No	yes	No	No	No	No	LNE		2.5-3	term	cu t	class 5
43	4	g3		yes			No	No	No	No	No	No	No	No	No	yes	No	No	No		elective	2-2.5	term	LSCS ST	class4
44	5	p	yes				No	No	No	No	No	No	No	No	No	No	yes	No	No	LNE		2.5-3	term	cu t	class4
45	3	p		yes			No	No	No	No	No	No	No	No	No	No	No	yes	yes	LNE		2-2.5	term	cu t	class4
46	4	p	yes				No	No	No	No	No	No	No	No	No	No	No	No	No	LNE		1.5-2	term	cu t	class4

47	2	p		yes			No	No	No	No	No	No	No	No	No	No	No	No	No	LNE		1.5-2	term	cu t	class3
48	1	p		yes			No	No	No	No	No	No	No	No	No	No	No	No	yes	No	LNE		1.5-2	term	cu t	class3
49	2	g2	yes				No	No	No	No	No	No	No	No	No	No	No	yes	No	No		elective	1.5-2	term	LSCS ST	class4
50	2	p		yes			No	No	No	No	No	No	No	No	No	No	yes	No	No	yes	LNE		2-2.5	term	cu t	class3
51	3	p	yes				No	No	No	No	No	No	No	No	No	No	No	yes	No	No	LNE		2-2.5	term	cu t	class3
52	4	p	yes				No	No	No	No	No	No	No	No	No	No	yes	No	No	No	LNE		2.5-3	term	cu t	class4
53	5	g3		yes			No	No	No	No	No	No	No	No	No	No	yes	No	No	No		elective	1.5-2	term	LSCS ST	class3
54	4	p	yes				No	No	No	No	No	No	No	No	No	No	No	yes	No	yes	LN		2-2.5	term	cu t	class2
55	4	g2	yes				No	No	No	No	No	No	No	No	No	No	yes	No	No	No	LN		1.5-2	term	cu t	class3
56	4	g2		yes			No	No	No	No	No	No	No	No	No	No	yes	No	No	No	LN		1.5-2	term	cu t	class3
57	3	p		yes			No	No	No	No	No	No	No	No	No	No	No	yes	No	yes	LN		2-2.5	term	cu t	class4
58	2	p		yes			No	No	No	No	No	No	No	No	No	No	No	yes	No	No	LN		2.5-3	term	cu t	class4
59	2	g4		yes			No	No	No	No	No	No	No	No	No	No	No	yes	No	No		electivee	1.5-2	term	LSCS ST	class2
60	3	p		yes			No	No	No	No	No	No	No	No	yes	No	No	No	No	yes	LN		2-2.3	term	cu t	class2
61	1	g3		yes			No	No	No	No	No	No	No	No	No	No	No	yes	No	yes	LN		1.5-2	term	cu t	class2
62	2	p	yes				No	No	No	No	No	No	No	No	No	No	yes	No	No	No	LN		2-2.5	term	cu t	class2
63	4	g3		yes			No	No	No	No	No	No	No	No	No	No	No	No	yes	No	LN		2-2.5	term	cu t	class2
64	5	p	yes				No	No	No	No	No	No	No	No	No	No	No	No	No	No	LN		2.5-3	term	cu t	class2
65	3	p		yes			No	No	No	No	No	No	No	No	No	No	No	No	yes	No	LN		1.5-2	term	cu t	class4
66	2	p		yes			No	No	No	No	No	No	No	No	No	No	yes	No	No	No	LN		1.5-2	term	cu t	class4
67	5	p	yes				No	No	No	No	No	No	No	No	yes	No	No	No	No	No	LN		2-2.5	term	cu t	class1
68	4	p	yes				No	No	No	No	No	No	No	No	yes	No	No	No	No	No	LN		1.5-2	term	cu t	class1
69	1	g2	yes				No	No	No	No	No	No	No	No	No	No	yes	No	No	No		elective	2-2.5	term	cu t	class3
70	3	P	yes				No	No	No	No	No	No	No	No	No	No	yes	No	No	No	LNE		2-2.5	term	cu t	class2

Master Chart Key

Age 1 - <20 Years

Age 2 - 20-24 Years

Age 3 - 25-29 Years

Age 4 - 30-34years

Age 5 - More Than 35 Years

SE CLASS - Socio Economic Class

CLASS 1 - Upper Class

CLASS 2 - Upper Middle

CLASS 3 - Lower Middle

CLASS 4 - Upper Lower

CLASS 5 - Lower

CHD ASD - Congenital Heart Disease – Atrial Septal Defect

RH-VE - Rhesus Negative Pregnancy

RHD - Rheumatic Heart Disease

MR - Mitral Regurgitation

MS - Mitral Stenosis

AR - Atrial Regurgitation

VSD - Ventricular Septal Defect

PDA - Patent Ductus Arteriosus

MVP- - Mitral Valve Prolapse

GHT - Gestational Hypertension

GDM - Gestational Diabetus Mellitus

CHD - Congenital Heart Disease

HYPOTYR - Hypothyroidism

NVD - Noraml Vaginal Delivery

LSCS - Lower Segment Cesarean Section

BIRTH WE - Birth Weight

TERM/PRE - Term/Preterm

CONTRAC - Contraception

EMER - Emergency Lower Segment Cesarean Section

Ster - Sterilisation

LN - Labour Naturalis

cu t - Copper T

LN LP - Labour Naturalis With Lacerated Perineum

Elective - Elective Lower Segment Cesarean Section

VBAC - Vaginal Delivery After Cesarean Section

lscs ster - Lower Segment Cesarean Section With Sterilisation

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