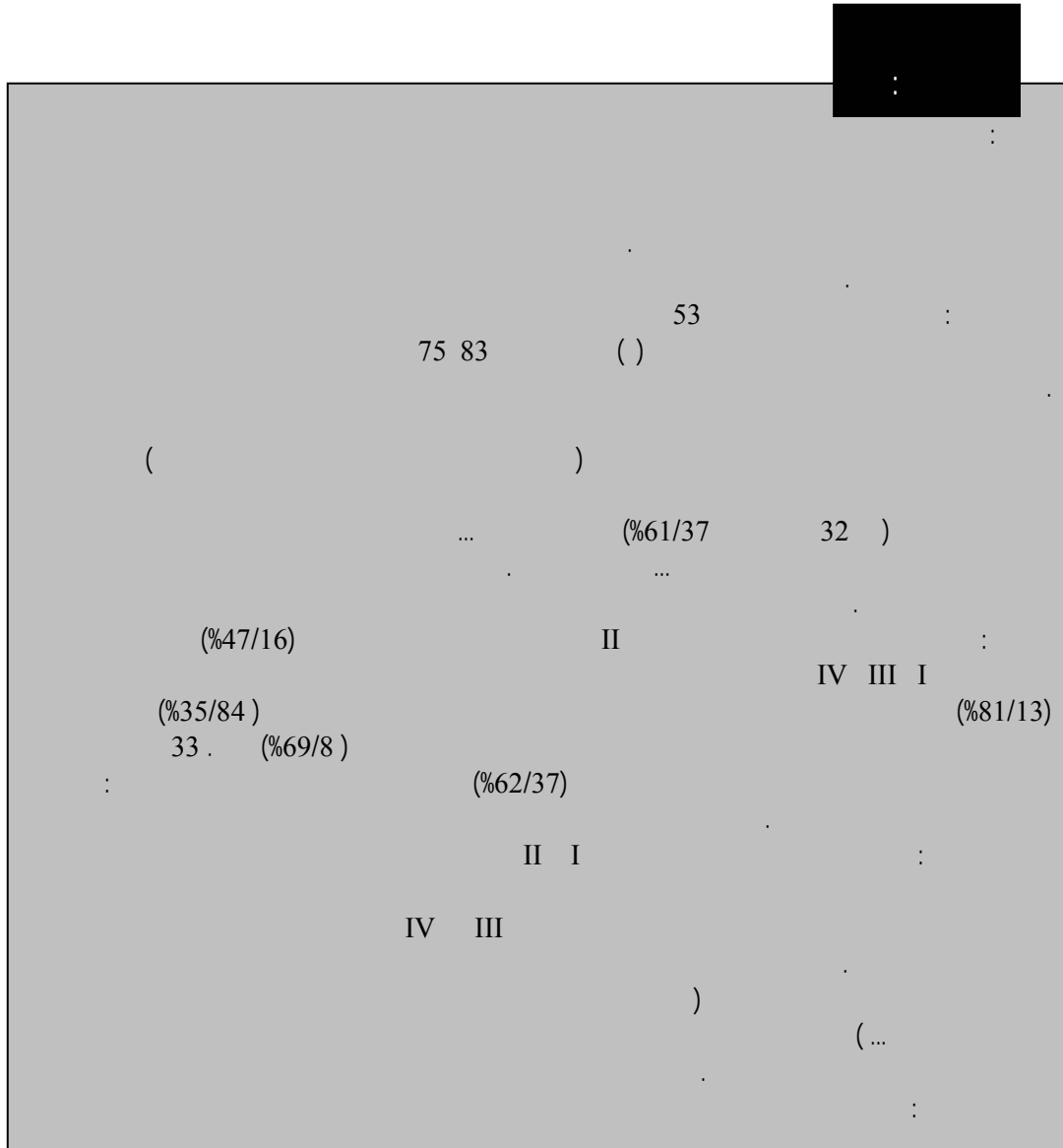


**Seven Years Study of Pregnant Women with  
Cardiovascular Disease Department of Cardiology,  
Imam Reza Hospital Mashhad IRAN (1996-2003)**

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**Introduction:**

Pregnancy and the peripartum period are associated with important cardio circulatory changes, that can lead to marked clinical deterioration in women with heart disease .

The aim of medical management is to help a mother to have a preferred pregnancy, normal delivery, health newborn and protection of worsening of heart disease .

For the above reasons, we decided to study pregnancy and cardiovascular disease over a 7-year period in the pt of Cardiology Imam Reza Hospital. A retrospective study performed over a period of 5 years in the Department of Obstetrics and Gynecology in King Khalid University Hospital, Riyadh, Kingdom of Saudi Arabia. The valvular heart disease was present, either as a single valve involvement or in combination, in 76% of the patients(1).

**Materials & Methods:**

In this prospective study we evaluated. 53 pregnant women with heart disease, who were admitted to Dept of Cardiology, Imam Reza Hospital before or immediately after delivery.

Maternal gestational age, parity, kind of heart disease, history of cardiac surgery, and also abortion, stillbirth, and functional classes based on New York Heart Association classification were done .

In their past medical history, abortion, and stillbirth were evaluated (Table2). Also functional classification was assessed. Paraclinic study including blood and urine tests, chest X-Ray, ECG, echocardiography (only on 32 pts, 61.3%) ultrasound etc were performed .

The kind of delivery, new born's APGAR and weights , maternal and fetal mortality rate were assessed. Finally statistical evaluations were done.

**Results :**

Average age of patients were 29.25 years (Table1), and the average parity

was 3.81. It means 8 pregnant women were primigravida] (15.68%) and 31 patients were multigravida](60.78%). The history was having 2-5 pregnancies. 11(21.56%) pts had 6-10 pregnancies and that surprised us, one patient was multi pare 15 .

One of the clinical criteria in pts with heart disease is (NYHA) functional classification. In our pts depending on the prevalence was:

- class II (47.16%) 25 pts
- class I (33.96%) 18 pts
- class III (13.20%) 7 pts
- class IV (5.66%) 3 pts

The history of cardiac surgery : 7 pts (16.2%)

- 4 pts valve Replacement (7.54%)
- 2 pts Mitralvalvuloplasty (3.77%)
- 1 pts Repair of VSD (1.88%)

13.2% had previous cardiac surgery before pregnancy. Maternal mortality rate was 1.88% in this group of pts.

33 (62.37%) of pts mentioned had the history of fetal and newborn complications, in their past medical history, like: abortion, premature labor, and still birth. Average newborn, weight was within normal limits.

Of 53 pts, one of them who was admitted due to CVA, unfortunately after a few days, died of pulmonary edema , in 28<sup>th</sup> weeks of pregnancy .

The remainder: 46 pts had normal vaginal delivery (88.67%) and 6 pts cesarean section (11.32%).

Neonatal complications were evaluated in these pts, 5 newborns died immediately after delivery (19.43%) 11 cases were premature (20.75%), and the remainder had normal weight depending on gestational age.

Also the neonatal's APGAR scores were evaluated: Most term newborns had APGAR  $\geq$  8 and preterm between 7-9. Six newborns in less than 30 weeks of gestational age had APGAR  $\leq$  4 but unfortunately 5 of them died; therefore the fetal mortality rate was 9.43% in our study.

Most causes of admission to the Cardiology Department was the history of cardiovascular disease (Figure I)

Their clinical manifestations (Figure II) were evaluated. Underlying disease was also evaluated (Figure III).

The average of systemic arterial pressure was 116.3/74.5 mm Hg, the maximum was 160/110 mm Hg, and the minimum was 90/40 mm Hg in our patients.

#### **Discussion:**

Blood volume increases substantially during pregnancy, starting as early as the sixth week and rising rapidly until midpregnancy, when the rise continues but at a much slower rate. The degree of maximum volume expansion varies considerably in the individual patient and averages 50 percent (2,3). This increase is reported to correlate with fetal weight, placental mass, weight of the products of conception, and maternal and neonatal weight (4,5). A higher increment in blood volume is reported in multigravidas and in women with multiple pregnancies (6).

Cardiac output during pregnancy is estimated to increase by approximately 50 percent. It begins to rise around the fifth week and increases rapidly until the 24<sup>th</sup> week, when it levels off or continues to rise slightly (7).

The increase in cardiac output early in pregnancy is predominantly due to augmentation in stroke volume, whereas in the third trimester it is largely due to an accelerated heart rate and stroke volume does not change or even declines as a result of caval compression. Increase in cardiac output seems to be enhanced in subsequent pregnancies. Heart rate peaks during the third trimester with an average increase of 10 to 20 beats/min, although on occasion it may be markedly faster. Pregnancy with multiple fetuses is associated with an even higher heart rate (8,9).

Systemic arterial pressure begins to fall during the first trimester, reaches a

nadir in mid pregnancy, and returns toward pre gestational levels before term. Because diastolic blood pressure decreases substantially more than systolic pressure, the pulse pressure widens. Reduction in blood pressure is caused by a decline in systemic vascular resistance related to reduced vascular tone (2).

Homodynamics are altered substantially during labor and delivery secondary to anxiety, pain, and uterine contractions. Oxygen consumption increases threefold; cardiac output rises progressively during labor because of increases in both stroke volume and heart rate, and it is higher in the lateral position. Both systolic and diastolic blood pressures increase markedly during contractions, with greater augmentation during the second stage (3). In our study the average of systemic arterial pressures was 116.3/74.5 mm Hg.

To avoid the homodynamic changes associated with vaginal delivery, cesarean section is frequently recommended for women with cardiovascular disease (2). However, this form of delivery can also be associated with considerable homodynamic fluctuations related largely to intubation, drugs used for anesthesia and analgesia, larger extent of blood loss, the relief of caval compression, extubation, and postoperative awakening (10,11).

A temporary increase in venous return may occur immediately after delivery because of relief of caval compression and, in addition, blood shifting from the contracting uterus into the systemic circulation (auto transfusion). This change in effective blood volume occurs despite blood loss during delivery and can result in a substantial rise in ventricular filling pressure, stroke volume, and cardiac output and may lead to clinical deterioration. Both heart rate and cardiac output return to pre labor values by 1 hour after delivery and mean blood pressure and

stroke volume by 24 hours after delivery. Hemodynamic adaptation to pregnancy persists post partum and gradually returns to pre pregnancy values within 12 to 24 weeks after delivery(2,4,5,6,7).

Cardiovascular drugs are often used in pregnancy for the treatment of maternal and fetal conditions. Mothers could also require continued postpartum drug therapy. Most cardiovascular drugs taken by pregnant women can cross the placenta and therefore expose the developing embryo and fetus to their pharmacologic and teratogenic effects (12).

The successful management of the women with heart disease in pregnancy required complete cooperation between the patient: herself, the obstetrician, cardiologist, anesthetist and other supporting medical staff, to optimize the outcome for both the mother and her baby(13).

More women with congenital heart disease are reaching adulthood and want to become pregnant(14). The hemodynamic changes during pregnancy are an additional burden for women with heart disease. Risk factors for occurrence of important cardiac problems during pregnancy are: Previous cardiac events, lower functional class, cyanosis, left-sided heart obstruction or a diminished systolic function of the systemic ventricle. Pregnancy is contraindicated in pulmonary hypertension, in Marfan syndrome with in ascending aorta diameter of > 50 mm and in severe mitral or aortic valve stenosis. The recurrence risk for children varies between 3 and 50%, depending on the nature of the congenital heart disease. Fetal outcome depends on the haemodynamic situation and medication use of the mother. ACE inhibitors are contraindicated during pregnancy.



Table 1: Percent of patients, age who admitted to Dept of Cardiology Imam Reza Hospital during 7 years

Percent	Number	Age
32%	17	20-25
35.8%	19	26-30
18.8%	10	31-37
13.4%	7	38-45

Table 2 : The percent of abortion or stillbirth in patients with CVD, Dept of Cardiology Imam Reza Hospital during 7 years .

Type of Disease Abortion & Stillbirth	MS	RHD	CHD	Arrhythmias	CHF	Total
Abortion	62.5=5%	12.5=1%	12.5=1%	-	12.5%=1	8
stillbirth	40=2%	20=1%	-	20%=wpw=1	20%=1	5

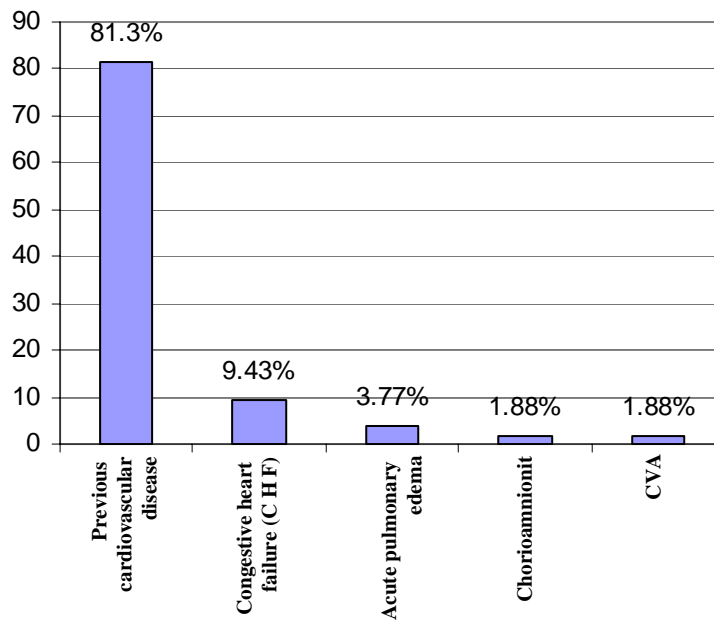


Figure I : Percent of presentation of referral patients to Dept of Cardiology, Imam Reza Hospital during 7 years

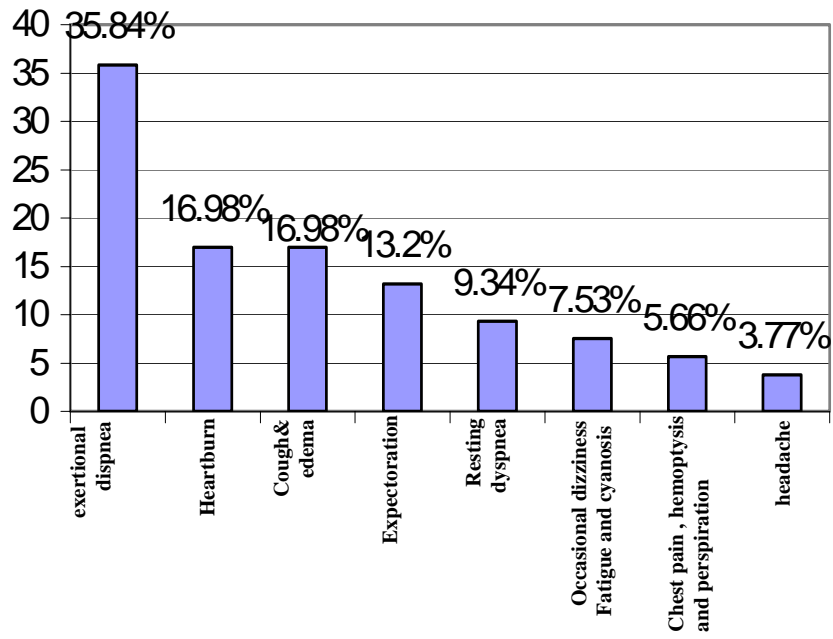


Figure II: The clinical symptoms of patients admitted to Dept of Cardiology Imam Reza Hospital during 7 years

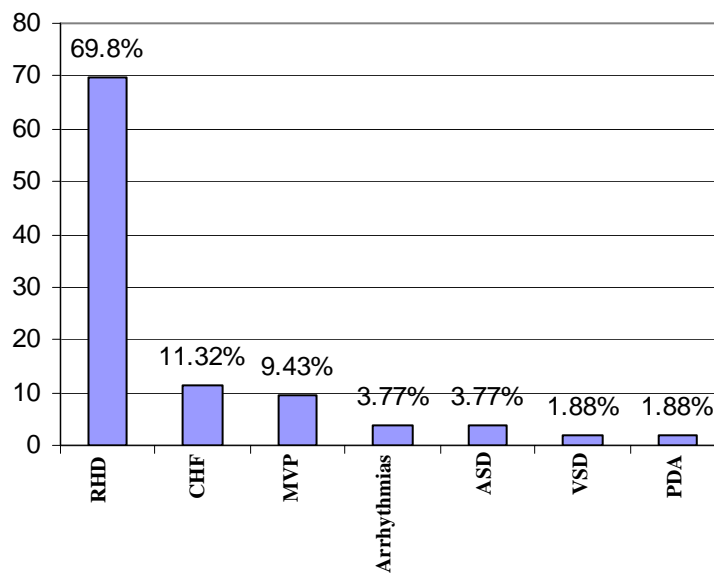


Figure III: Percent etiology of heart disease in pregnant woman admitted to Cardiology Department Imam Reza Hospital during 7 years



## Abstract :

**Objective:** In this study we evaluated cardiovascular changes during pregnancy . Our main aim was, in cardiovascular disease , pregnancy causing worse heart problems and increase functional classes during gestation. In which groups of patients, before pregnancy, is therapeutic management like intervention or surgery necessary to be performed, and fetal and newborn complications, evaluated.

**Methods and Materials:** In this prospective study we evaluated, 53 pregnant women with heart disease who were admitted to Dept of Cardiology, Imam Reza Hospital before or immediately after delivery .

Maternal gestational age, parity, the kind of heart disease history of cardiac surgery, and also Abortion, stillbirth, and functional classes based on New York Heart Association classification were done.

After collection of information, percent of the data was assessed and presented.

**Results:** At the time of admission (47.1%) of patients were in functional class II, class I (33.9%) class III. (13.2%), class IV (5.6%). In this study the most common cause of cardiovascular disease (Figure III) was rheumatic heart disease (69.8%) and the most common cause of patients admission to hospital (Figure I) was those, with the history of heart disease (81.1%), and most common clinical manifestation (Figure II) was exertional dyspnea (35.8%) .

**Conclusion:** Patients with MR, mild MS, AI & mild AS, VSD and functional class I & II can tolerate pregnancy and delivery well. But usually for pts in class III, IV, they will have serious problems during pregnancy and delivery.

The decision of continuation or termination of pregnancy in high risk pts for example severe MS, AS and pulmonary hypertension, izenmenger's syndrome, high functional class are depending on the consultation between cardiologist, cardiac surgeon, obstetrician and pts family .

**Key Words:** Pregnancy, Cardiovascular Disease, Rheumatic Heart Disease, Congenital Heart Disease .

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