

Maternal and Neonatal Outcome in Women with Cardiac Diseases and Suggested Nursing Guidelines

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Abstract

Background: Cardiac disease is the indirect and the third most common cause of maternal mortality. It may be congenital or acquired.

Aim of the study: The current study aimed to determine the profile of patients with heart diseases, find out the maternal and neonatal outcome and design a nursing guideline for the management of cardiac diseases during pregnancy.

Design: A descriptive design was used to conduct this study.

Setting: The present study was conducted at obstetric department, labor ward at Maternity and Childhood hospital in Zagazig University Hospitals.

Sample: A purposive sample of all parturient women attending the study setting; 70 women were recruited during 10 months.

Tools: Tools used for data collection were: A structured interview sheet, clinical assessment form, maternal assessment sheet, newborn assessment sheet and nursing guidelines about the management of cardiac diseases.

Results: Maternal age was (25-35) years old with mean age (29.1±5.7). Rheumatic heart disease (84.2%) was the most common type of cardiac lesions with mitral stenosis (71.2%) the prevalent valvular lesion. Cesarean section (70%) was the most common mode of delivery due to previous CS, cardiac condition and fetal factors. Arrhythmias, anemia and preeclampsia were the most common problems encountered with current pregnancy (42.9%, 35.7% and 20% respectively). Cardiac diseases resulted in ICU admission, heart failure and obstetric complications. Moreover, Lower Apgar score, preterm baby, and NICU admission were the most neonatal complications.

Conclusion: Rheumatic heart disease is still a predominant cardiac problem with higher rates of arrhythmias, hospitalization, maternal morbidity and neonatal adverse outcome.

Recommendations: Appropriate referral and multidisciplinary planning with the appropriate specialists in tertiary centers are mandatory to minimize the risk of complications. Written clinical nursing guidelines for the management of women with cardiac diseases should be used by the nursing staff.

Key Words: Cardiac diseases, Rheumatic heart disease, Arrhythmias, Heart failure, Outcome, Multidisciplinary planning, Nursing guidelines.

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I. Introduction

Worldwide, the number of women who have a pre-existing cardiovascular disease (CVD) or develop cardiac problems during pregnancy is increasing, and it is the leading cause of non-obstetric mortality during pregnancy.^[1] Heart disease complicates approximately 1–3% of pregnancies and is responsible for 10 to 15% of maternal mortality.^[2] The incidence of maternal CVD appears to be growing likely due to increasing maternal age, cardiovascular risk factors (such as : obesity, diabetes, and hypertension) and lifespan of patients with congenital heart disease.^[3]

Cardiac disease is classified into congenital or acquired heart disease. Congenital heart disease is further divided into a cyanotic and cyanotic heart disease. The common acyanotic congenital heart diseases are atrial septal defect (ASD), ventricular septal defect (VSD), pulmonary stenosis, patent ductus arteriosus (PDA), coarctation of aorta (COA) and marfan's syndrome while cyanotic heart diseases are Tetralogy of Fallot's, Eisenmenger's syndrome and pulmonary hypertension. Among acquired heart diseases, the most common is rheumatic heart disease. Others are coronary artery disease, cardiomyopathies, aneurysms, dissection of aorta and its branches.^[4] In the western world, congenital heart disease is the most frequent CVD present during pregnancy, whereas rheumatic heart disease dominates in the non-western countries.^[5]

According to National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand [6] cardiac disease is classified depending on functional status into: class I asymptomatic with normal activity, class II symptoms with normal activity, class III symptoms with less than normal activity and class IV symptoms with no physical activity or at rest. Pregnancy is accompanied by physiologic changes that stress the heart. [7] Several significant physiologic changes occur during pregnancy within the cardiovascular system that could become fatal in patients with a cardiac pathology. [8] These changes include; a 50% increase in blood volume, a 35% increase in cardiac output, decreased peripheral vascular resistance and decreased mean arterial blood pressure. [9]

Diagnosis of cardiac disease is harder depending on physiological changes during gestational period. Complaints for cardiac disease during pregnancy are progressive orthopnea, paroxysmal nocturnal dyspnea, hemoptysis, syncope occurred with exercise, chest pain, serious and progressive dyspnea. Findings of cardiac disease during pregnancy are cyanosis, digital clubbing, jugular venous distention, cardiomegaly, arrhythmia and pulmonary hypertension. [10]

There are various complications related to heart disease during pregnancy. Maternal complications which include: pulmonary edema, increased maternal morbidity and increased risk for cardiac complications, such as heart failure, arrhythmias and stroke. Fetal complications which include: intrauterine growth restriction (mild in cases of patients with rheumatic heart valve disease and severe in cases of lesions associated with cyanosis in the mothers), neonatal asphyxia, respiratory distress syndrome and fetal or neonatal death. [11]

It is essential to thoroughly evaluate patients for underlying cardiovascular disease in order to promote optimal care during pregnancy that plays a major role in the outcome. [12] The primary goal of nursing care for the pregnant woman and her family when cardiac disease complicates the pregnancy is prevention of complications that may occur from the cardiac condition through performing a comprehensive assessment to identify individual needs for teaching, emotional support and physical care. [13] This is accomplished by education of the woman and husband ; assessment of all systems involved on a routine basis; referral to appropriate nursing, nutritional, social and medical experts; and facilitation of patient participation in decisions. The nurse midwife plays a significant role in providing care for pregnant women with heart diseases. The nurse is often in the best position to advocate for the patient and coordinate the multidisciplinary team. Early diagnoses, follow up and counseling are keys for reducing morbidity and mortality and this strategy requires a collaboration between obstetrician, cardiologists and nurses. [14]

1.1. Significance of the Study

Heart disease during pregnancy is still a challenging condition because it is associated with elevated maternal and fetal morbidity and mortality. Cardiac disease is the indirect and the third most common cause of maternal mortality, so this study was done for more understanding of the effect of cardiac disease on maternal and neonatal outcome. The studies that were conducted in Egypt discussed the cardiac disease during pregnancy from a medical view of point and the nurses' roles were not investigated at all. Since this study was not done before at Zagazig University, it was essential to provide the nursing care for women with cardiac diseases by suggesting written nursing guidelines. The study was conducted to highlight the high risk women with cardiac diseases who represent a challenge in their management and develop nursing responses to improve outcomes.

1.2. Aim of the study

The current study aimed to determine the profile of patients with heart diseases, find out the maternal and neonatal outcome and design a nursing guideline for the management of cardiac diseases during pregnancy.

II. Subjects And Methods

2.1. Research design:

A descriptive design was used to conduct the present study.

2.2. Research setting:

The present study was conducted at the obstetric department, labor ward at Maternity and Childhood hospital in Zagazig University Hospitals.

2.3. Subjects:

The sample size was taken within 10 months of all parturient women with cardiac diseases; 70 women were recruited for this study, according to the **following inclusion criteria**; all parturient women with heart diseases, who presented to the hospital with or without complications, gestational age more than 28 weeks and primiparous and multiparous women, regardless of the maternal age.

Sampling technique: purposive sample of all parturient women with heart diseases attending the study setting and who fulfilled the study inclusion criteria.

2.4. Tools of data collection

Tool I: A structured Interview Sheet & History: It consisted of two parts:

Part 1: A structured Interview Sheet: It included data about age, occupation, education level and residence.

Part 2: History:

- **Medical and surgical history:** It included data about anemia, diabetes mellitus, chronic hypertension and surgical operations.
- **Obstetric history:** such as gravity, parity ...etc.
- **Current pregnancy history:** It included data about the use of medications during pregnancy, type of medications, history of receiving antenatal care, hospitalization during pregnancy and any problems encountered during the present pregnancy.
- **Cardiac disease history:** It included data about type of cardiac diseases (rheumatic heart diseases, congenital heart diseases, cardiomyopathies and coronary artery diseases).

Tool II: Maternal Assessment Sheet:

This sheet developed by the researcher to collect data about gestational age at delivery, mode of delivery and indications of cesarean section. It also included data about the presence or absence of Cardiac complications such as: ICU admission, heart failure, pulmonary edema...etc. In addition, Obstetric complications such as: tubal ligation, post-partum hemorrhage, hysterectomy...etc.

Tool III: Newborn Assessment Sheet: The following data was obtained:

- Neonatal Apgar score that developed by **Apgar** ^[15] at first minute and after 5 minutes.
- Birth weight (very low birth weight, low birth weight and normal birth weight).
- Neonatal complications such as: preterm baby, admission to Neonatal Intensive Care Unit, need for resuscitation, respiratory distress syndrome, physiological jaundice and neonatal death.

Tool IV: Nursing Guidelines about the management of cardiac diseases:

This was developed by **Government of Western Australia** ^[16] to summarize the nursing guidelines for the management of cardiac diseases during antepartum, intrapartum and postpartum periods. The researcher modified these guidelines and designed booklet for it; finally it was given to the nurses at Maternity and Childhood hospital.

2.5. Preparatory phase:-

A review of the available past & current related literature and theoretical knowledge of various aspects of the study was done using available books, articles at periodicals or magazines, or internet, to be acquainted with the research problem and develop the study tools.

2.6. Content validity:-

The validity of the tools was done by group of panel who were three experts from nursing and medical faculty staff who reviewed the tools and ascertained clarity, relevance, comprehensiveness, and understandability.

2.7. Pilot study

A pilot study was carried out on a sample of 7 parturient women with heart diseases (10% of the calculated sample) from Maternity and Childhood hospital in Zagazig University Hospitals and was later excluded from the sample. The purpose of the pilot study was to test the clarity and applicability of the study tools, arrangements of items, estimate the time needed for each sheet and the feasibility of the study and acceptance to be involved in the study.

2.8. Fieldwork

Once permission was granted to proceed with the study, the researcher started to collect the data. The researcher attended high risk pregnancy unit and labor ward the three hot days (Saturday, Monday and Wednesday) per week during morning and afternoon shifts within 10 months (the duration of data collection) . The researcher introduced herself and explained the aim of the study briefly; the nature of tool used for data collection, and reassured them that information obtained is strictly confidential and would not be used for any purposes other than research. The fieldwork was executed over ten months "from the first of February 2016 to the end of October 2016".

2.9. Ethical Considerations:

Firstly, the study protocol was approved by the pertinent committee (Research Ethics Committee) at Faculty of Nursing, Zagazig University. All ethical issues were taken into consideration during all phases of the study: the research maintained an anonymity and confidentiality of the subjects. The inclusion in the study was totally

voluntary. The aim of the study was explained to every woman before participation and an oral consent was obtained. Every woman was assured that the study maneuver will cause no actual or potential harm to her or her baby and professional help will be provided for her and for her baby whenever needed. Women were notified that they can withdraw at any stage of the research; also they assured that the information obtained during the study will be confidential and used for the research purpose only.

2.10. Administrative Design:

Before starting any step in the study, an official letter was issued from post graduate department, Faculty of Nursing, Zagazig University to the Maternity and Childhood hospital manager to request permission and cooperation to conduct the study, and to provide the researcher with the needed data.

2.11. Statistical Design:

After the collection of data, it was revised, coded and fed to statistical software package SPSS version 14. Microsoft office excel software was used to construct the needed graphs. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations and medians for quantitative variables.

III. Results

The parturient women with heart diseases enrolled in the current study were mainly at child bearing age (25 – 35) years old, illiterate and housewives (43% and 85.7% respectively) and belonged to rural areas. In addition, (84.2%) of women had rheumatic heart diseases and (71.2%) had mitral stenosis. Cardiac diseases were associated with cardiac and obstetric maternal complications and neonatal adverse outcome.

Table 1 describes socio-demographic characteristics of the studied women. As regards age, it was found that (64.3%) of the studied women aged (25- 35) years old, 85.7% were house wife, (43%) were illiterate and (57.1%) of them belonged to rural areas.

Table 2 represents that all studied group received antibiotics prophylaxis. Moreover, the use of anticoagulant medications followed by the use of long acting penicillin (LAP) and cardiac medications were the most common among the cardiac women (54.3% , 51.4% and 44.3% respectively).

Figure 1 illustrates that all women had antenatal care during current pregnancy with (74.3%) of them started it during the first trimester of pregnancy. The majority of women with cardiac diseases (84.3%) exposed to problems letting them hospitalized during current pregnancy.

On assessing problems encountered during pregnancy **Table 3** clarifies that arrhythmias (42.9%) was the most common problem followed by anemia, preeclampsia and varicose veins (35.7%, 20% and 14.3% respectively).

Regarding types of cardiac diseases **Table 4** shows that (84.2%) had rheumatic heart diseases followed by congenital heart diseases, cardiomyopathies and coronary artery diseases. Concerning rheumatic heart diseases the most common lesions were mitral stenosis (71.2%), mitral regurgitation (52.5%) and aortic regurgitation (42.4%) among cardiac women.

Concerning gestational age at time of delivery, **Figure 2** demonstrates that 57.1% of cardiac women were full term gestation whereas (37.2%) were preterm gestation .Also, it illustrates that 70% of women had cesarean section and (30%) of them had normal vaginal delivery.

Table 5 shows that the most common indication of CS among the cardiac women was previous cesarean section and tender scar (38.6%) followed by cardiac condition (28.6%). Meanwhile, (25.7%) of women had fetal factors for CS. As well as, PROM, malpresentation, failed progress of labor and hypertensive disorders were indications of CS among women with heart diseases.

Concerning complications among parturient women with cardiac diseases, **Table 6** represents that ICU admission (65.7%) was the most common complication among women. In addition, (20%) had tubal ligation and (15.7%) had heart failure. Moreover, they had obstetric complications.

Table7 shows Apgar score and birth weight among cardiac women; mean Apgar score at the first and fifth minutes was $(4.1 \pm 1.8$ & 5.7 ± 1.9 respectively). In addition, mean of the birth weight was (2635.7 ± 656.7) among them. The same trend also, represents neonatal complications among studied group. Preterm baby, newborns admission to the NICU and need for resuscitation (34.3% and 32.9% respectively) were the most common complications.

IV. Discussion

Cardiac disease in pregnancy is still a major problem worldwide, particularly in developing countries. Globally, cardiac disease complicates approximately 1% to 4% of pregnancies and responsible for 10% to 15% of maternal mortality.^[17] Women with pre-existing cardiac disease and those who are present with cardiac disease during pregnancy require specialist assessment and management during pregnancy, childbirth and the

postpartum period.^[18] Hence after, the current study aimed to determine the profile of patients with heart diseases, find out the maternal and neonatal outcome and utilize a nursing guideline for the management of cardiac diseases during pregnancy.

It is clear from the findings of the current study that the average age of women was nearly two thirds ranged between (25- 35) years with mean age (29.1±5.7). This might be due to the advances in surgical/anesthetic techniques improved treatment of CHD and cardiac care of RHD have increased the survival of these females until fertile age. This is partially in coherence with Soliman et al^[19] in Egypt, who reported that the average maternal age was 25 years and more. Additionally, Yassin et al^[20] in Sudan and Eltebi^[4] in Egypt found that mean age of women was (29.8 ± 6.4 and 28 ± 6,336 years respectively) in their studies. Meanwhile, Kapoor et al^[21] at prospective observational study in India found that high percentage of their patients were in age group 21 – 25 years.

The present study showed that the majority of cardiac women were house wives. This finding is consistent with an Indian study conducted by Indira et al^[22] who found that (84%) were housewives. Regarding educational level the current study revealed that more than two fifth of women were illiterate. This finding partially corresponds with the findings of Campanharo et al^[23] in Brazil who reported that (68%) of their patients had low educational level. Additionally, the current study showed that more than half of women belonged to rural area. This finding may be explained by lack of medical awareness among rural areas. It is matching with an Indian study was done by Pandey et al^[12] who showed that the prevalence of heart disease in pregnancy increased among the rural population (58.9%) and in lower socio economic strata.

Regarding types of medications used during current pregnancy, antibiotics prophylaxis were given for all the cardiac women. They were given throughout pregnancy and particularly at the time of delivery to prevent for bacterial endocarditis. This finding agrees with Nagamani et al^[24] in Southern India and Priya et al^[25] who found that infective endocarditis prophylaxis was given to all patients with cardiac diseases. In addition, anticoagulants were given to more than half of cases in present study especially to women with mechanical heart valves. Basude et al^[26] interprets this finding by the fact that women with mechanical heart valves require lifelong anticoagulation, including during pregnancy because of the increased risk of thrombosis and the pregnancy cause thrombogenic effect. Similar to this finding, a study done by Nishimura et al^[27] reported that all women with mechanical heart valves treated with therapeutic anticoagulation throughout pregnancy. As well, several studies conducted by Drenthen et al^[28] and Ruys et al^[29] mentioned that frequently used medications with cardiac women include anticoagulants and platelet aggregation inhibitors.

The present study also stated that more than half of women received rheumatic prophylaxis (LAP). This might be attributed to prevent long term consequence of rheumatic fever as recurrent attacks of rheumatic fever resulting in ongoing inflammation and fibrosis with consequent valvular damage. Similarly, Indira et al^[22] reported that prophylaxis against rheumatic fever was given in patients with rheumatic heart disease. Also, Priya et al^[25] mentioned that (62.5%) of women were on penicillin prophylaxis and it was continued throughout pregnancy. Moreover, more than two fifth of women received cardiac medications. This finding comes in line with a Pakistan study of Asghar and Kokab^[10] who reported that digoxin was required in (40%) of cases. Also, Ruys et al^[29] found digoxin was given to women with cardiac diseases.

All patients in present study received antenatal care with nearly three quarter of them were booked in the 1st trimester of pregnancy. This finding reflects proper knowledge about the significance of the regularity of antenatal checkup and its role in the early detection of some problems which may contribute to the occurrence of maternal and neonatal further complications. These findings in congruence with an Egyptian study done at Menoufia University by Soliman et al^[19] who found that the majority of patients (93%) were given antenatal care. In the same vein, Nagamani et al^[24] in Southern India showed that (78.3%) received prenatal care among their cardiac women. Conversely, Yasmeeeny et al^[30] in Pakistan reported that regarding antenatal care (75%) patients were unbooked. The majority of women in the current study were exposed to problems letting them hospitalized during current pregnancy. Recently, several studies by Taha et al^[31] and Roos-Hesselink et al^[32] stated that during pregnancy women hospitalized due to obstetric and cardiac reasons or both.

Interestingly, arrhythmias were the most common cardiac complication during current pregnancy. Similar finding was reported by Drenthen et al^[28] and Diao et al^[33] in sub-Saharan Africa in their studies. Concerning anemia Indira et al^[22] and Biswas et al^[34] mentioned that cardiac women were exposed to moderate to severe anemia. This finding is interpreted by the fact that, anemia occurs because plasma volume increases more rapidly than red blood cell mass during pregnancy which supported by Lam^[35] in Texas. Furthermore, the present study revealed that one fifth of women had preeclampsia. In agreement with this finding Pieper et al^[36] found that HTN and PIH were more prevalent in women with CVD than in healthy women.

Among women with heart disease in present study, RHD was the most common etiology and was found in majority of patients. More than one cardiac lesion was involved in some cases. This finding was nearly in accordance with studies by Pandey et al^[12] in India and Eltebi^[4] at Cairo University in Egypt who revealed that (82.1% and 80.8% respectively) of patients had RHD which highlighted that the heart disease of rheumatic origin is still rampant in these countries. Parallel with the present study findings Chhetri et al^[37] in Nepal

highlighted that RHD was the most frequent cardiac disease complicating pregnancy. Similar finding in a study done by Brasington^[38] showed that RHD was a major burden in developing countries. In the same way, similar results in the studies conducted by Sliwa & Böhm^[39] and Sliwa et al^[40] in South Africa and other developing countries. Also, several studies by Doshi et al^[41] and Ciccone et al^[42] who reported that RHD was the main etiology of heart disease complicating pregnancy.

Concerning RHDs in the current study, mitral stenosis (MS) and mitral regurgitation (MR) was the most common lesion followed by other valvular lesions among women. This is in accordance with the findings of Groe et al^[43] who reported that MS was the commonest lesion followed by MR and then other combined valvular lesions. Additionally, the study by Yasmeen et al^[30] mentioned that MS was the predominant lesion (71.2%) in the patient with RHD. In the same vein, in the European Registry on Pregnancy and Heart Disease carried by Roos-Hesselink et al^[32] which included women from North America, Europe, the Russian Federation, Egypt, and others, MS and/or MR were the most common types of valvular pathologies. Also, several studies by Nayak et al^[44] and Elkayam et al^[45] reported that MS was the most common manifestation of RHD.

In the present study, one tenth of patients had congenital heart disease. This nearly corresponds with the findings of Eltebi^[4] in Egypt and Martins et al^[46] in Barzil who showed that (12.2% and 13.65%) had congenital heart diseases in their studies respectively. On the contrary, Barberis^[5] in US and non-western countries asserted that CHD was the most common form of heart disease in pregnancy. In this regard, in the western world a lot of studies carried by Lam^[35] in Texas, Pijuan-Domènech et al^[47] in Spain and Roos-Hesselink & Stein^[48] in Netherlands illustrated that CHD was the commonest heart problem.

Regarding gestational age in present study, more than half were full term pregnancies. This is partially in coherence with Fatima et al^[49] in Pakistan who showed that (59.3%) of women had a full-term pregnancy. In addition, this finding nearly corresponds with Campanharo et al^[23] in Barzil who found that gestational age at delivery (≥ 37 Weeks) was (52.1%).

Concerning mode of current delivery in the present study, the most common mode of delivery was CS and nearly one third of cases delivered vaginally. The high rates of CS in the present study were due to various obstetric and/or cardiac reasons. This finding in accordance with the result of a Brazilian study carried by Campanharo et al^[23] who revealed that the most common mode of delivery was CS (76.7%). In several studies conducted by Huisman et al^[50] and Maggioni et al^[51] the rate of CS was (54.8% & 45.5% respectively) in the cardiac disease population. These findings in contrast to Sheela et al^[52] in India who reported that the majority of cases (73%) delivered vaginally.

As shown in the present study, CS indications were more common among cardiac women with previous CS and tender scar, cardiac condition, fetal factors. As well as, PROM, malpresentation, failed progress of labor and hypertensive disorders were indications of CS. This corresponds well with the finding of an Indian study by Biswas et al^[34] who revealed that indications of CS (varied between emergency and elective CS) were induction failure, post-cesarean pregnancy, fetal distress, maternal distress, non-progress of labor, moderate PH, atrial flutter and preeclampsia. In addition, ESC^[53] and Asfour et al^[54] concluded that CS indicated in a proportion of high risk patients with cardiac diseases.

It was significant to notice the high rates of ICU admissions in present study. This might be attributed to early detection and adequate management of potential cardiac decompensation and to maintain hemodynamic stability for cardiac women. In consistent with this finding, Campanharo et al^[23] in Barzil reported that women with heart diseases admitted to ICU during postpartum period.

As regards heart failure in the current study, it was encountered in more than one tenth of cases and considered the predominant cardiac complication. This might be due to during the first 24-72 hours post delivery, significant fluid shifts resulting in fluid overload can lead to congestive cardiac failure. So vital signs and fluid balance charts should be carefully maintained to prevent HF. This finding comes in line with Taha et al^[31] in Egypt and Groe et al^[43] in India who reported that (13.2% and 16.7%) of their women had heart failure. In the same vein, other studies conducted by Martins et al^[46] in Barzil and Roos-Hesselink & Stein^[48] in Netherlands asserted that HF was the most common cardiac complication in their investigated women. Similarly, Ruys et al^[55] concluded that HF was the most common complication and occurred typically at the end of the second trimester, or after birth.

The present study finding also showed that postpartum hemorrhage, hysterectomy and other obstetric complications occurred among cardiac women. Hemorrhagic events might be due to marked anemia, retained placental membrane, the use of anticoagulants especially in women with PHVs and CS which abrupt hemodynamic changes, resulting in PP hemorrhage. Similarly, Abdel Ghani et al^[14] in Egypt illustrated that women suffered from atonic uterus and PP hemorrhage. In addition, Choreño-Machain et al^[8] in Mexico reported that cardiac patients had uterine hypotonic and hemorrhagic events. In the same line, post-delivery bleeding, as well as vaginal and perineal trauma, increased in women with cardiac diseases mentioned by McLintock et al^[56] and Quinn et al.^[57]

The current study revealed that newborns had low Apgar score and nearly one third of them had low birth weight with mean birth weight (2635.7± 656.7). A similar finding was supported by Taha et al^[31] in Egypt that Apgar score and birth weight were low in the high-risk group and mean birth weight was (2513.7 ±922.2) and a similar finding was reported by Soma Pillay et al.^[58] Also, in other studies by Bangal et al^[59] and Leary^[7] stated that low birth weight babies were higher among patients with heart diseases.

Women with cardiac diseases in current study had adverse outcomes with preterm baby was the commonest neonatal complication. Similarly, several studies by, Huisman et al^[50] and Yassin et al^[20] in Sudan revealed that (38% & 26.36%) were premature babies of their cases. In the same context, Soma-Pillay et al^[58] and Doshi et al^[41] reported similar results regarding mothers with cardiac disease were more likely to have preterm birth and babies with low birth weight. Moreover, nearly two thirds required admission to the NICU in current study. Also, Koregol et al^[60] reported that (30.1%) of their babies required NICU admission.

There are various explanations for the increased rate of neonatal complications; a decrease in maternal oxygen saturation is directly related to birth weight and perinatal mortality. Adverse perinatal outcome may be explained by the decrease in uteroplacental blood flow resulting from haemodynamic compromise in patients with cardiac disease. Placental insufficiency plays a role in preterm delivery as the fetal cardiac contractility and output are adversely affected by hypoxaemia resulting from uteroplacental insufficiency

V. Conclusion

The results of the current study bring about the conclusion that; Cardiac diseases were more likely among women at childbearing age, housewives, illiterates and belonged to rural areas. Cardiac women were more likely to have medications for various indications and problems encountered during their current pregnancy. RHD is still a predominant cardiac problem with higher rates of arrhythmias, hospitalization, CS and maternal morbidity. In addition, women with heart disease had high risk for cardiac & obstetric maternal complications and neonatal adverse outcome.

VI. Recommendations

On the basis of the current study findings, the following recommendations are suggested; appropriate referral and multidisciplinary planning with the appropriate specialists in tertiary centers are mandatory to minimize the risk of complications. The maternity nurse should focus on monitoring and reducing considerable maternal, fetal and neonatal complications. Written nursing guidelines for the management of women with cardiac diseases should be used by the nursing staff.

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Table 1: socio-demographic characteristics of cardiac women with heart diseases (n=70):

Socio demographic data	No	%
Age (years)		
▪ <25	14	20.0%
▪ 25-	45	64.3%
▪ 35-45	11	15.7%
▪ Mean ± SD	29.1 ± 5.7	
Occupation		
▪ House wife	60	85.7%
▪ Working	10	14.3%
Education		
▪ Illiterate	30	43%
▪ Primary & preparatory school	12	17%
▪ Secondary school	20	28.6%
▪ University	8	11.4%
Residence		
▪ Rural	40	57.1%
▪ Urban	30	42.9%

Table 2: Current pregnancy history among women with cardiac diseases (n=70):

Current pregnancy history(Type of medications) §	No	%
▪ Antibiotics prophylaxis	70	100.0%
▪ Anticoagulant medications	38	54.3%
▪ The use of long acting penicillin (LAP)	36	51.4%
▪ Type of cardiac medications	31	44.3%
▪ Antihypertensive drugs	23	32.9%
▪ Tocolytics	14	20.0%

§ The total is not mutually exclusive

Figure 1: Utilization, onset of antenatal care visits & hospitalization during current pregnancy (n=70):

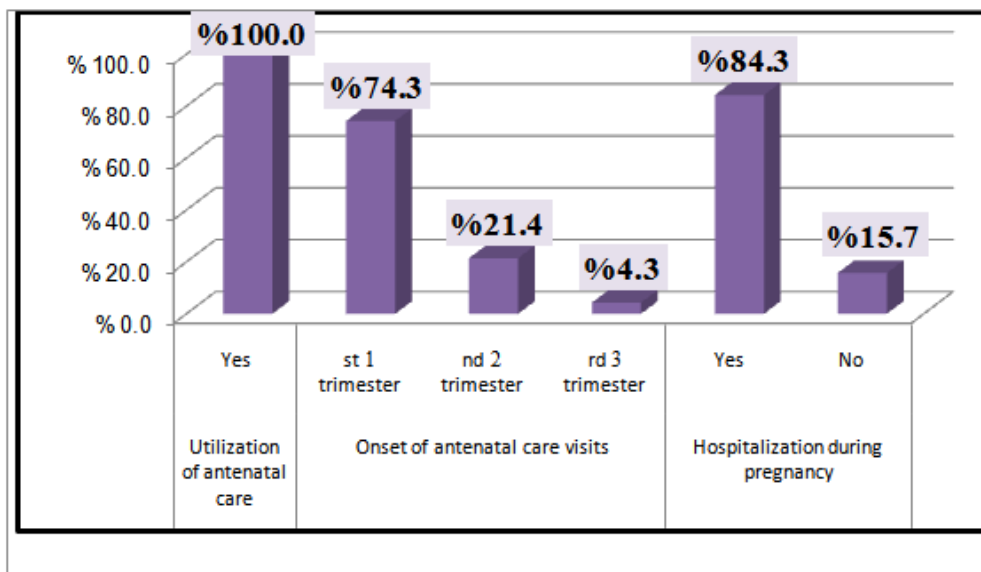


Table 3: Problems associated with current pregnancy among women with cardiac diseases (n=70):

Problems associated with pregnancy §	No	%
▪ Arrhythmias	30	42.9%
▪ Anemia during pregnancy	25	35.7%
▪ Preeclampsia (PIH)	14	20.0%
▪ Varicose veins	10	14.3%
▪ Placenta previa (PP)	7	10.0%
▪ Gestational diabetes (GD)	5	7.1%
▪ Placenta accrete	4	5.7%
▪ Valve thrombosis (thromboctomy)	4	5.7%

§ The total is not mutually exclusive

Table 4: Types of heart diseases by Echocardiography among women with cardiac diseases (n=70):

Types of cardiac diseases by Echocardiography	No	%
I. Rheumatic heart disease§	59	84.2%
▪ Mitral stenosis	42	71.2%
▪ Mitral regurgitation	31	52.5%
▪ Aortic regurgitation	25	42.4%
▪ Tricuspid regurgitation	14	23.7%
▪ Mitral valve prolapsed	8	13.6%
▪ Aortic stenosis	6	10.2%
▪ Aortic valve prolapsed	2	3.4%
▪ Pulmonary regurgitation	2	3.4%
II- Congenital heart disease	7	10%
▪ Atrial septal defect (ASD)	3	42.9%
▪ Pulmonary stenosis	3	42.9%
▪ Eisenmenger syndrome	1	14.3%
III- Cardiomyopathies	2	2.9%
IV- Coronary artery diseases	2	2.9%

§ The total is not mutually exclusive (There are more than one cardiac lesion)

Figure 2: Gestational age at time of delivery & Mode of Delivery (n=70):

Indications of cesarean section §	No	%
▪ Previous cesarean section & tender scar	27	38.6%
▪ Cardiac condition (cardiologist consultation)	20	28.6%
▪ Fetal factors(fetal distress and presence of meconium)	18	25.7%
▪ PROM	12	17.1%
▪ Malpresentation	11	15.7%
▪ Failed progress of labor	9	12.9%
▪ Hypertensive disorders	8	11.4%
▪ Multiple gestations	7	10%
▪ Placenta previa	7	10 %
▪ Oligohydrominos	7	10%
▪ Diabetes	4	5.7%

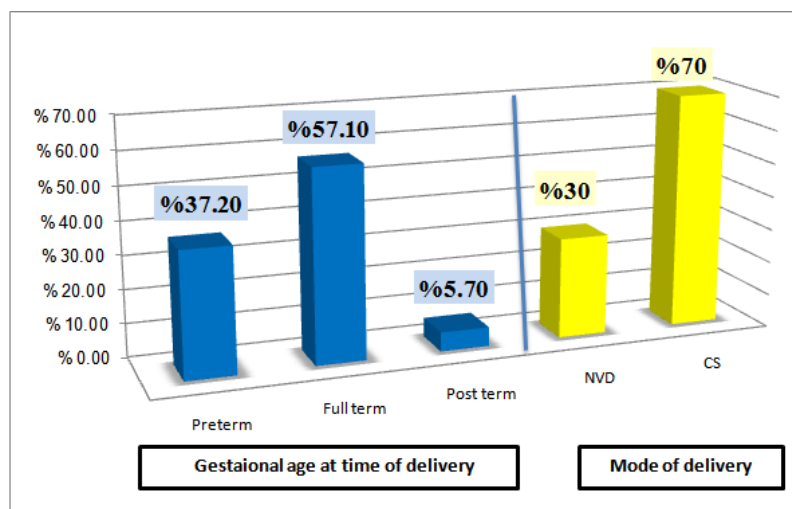


Table 5: Indications of cesarean section among women with cardiac diseases (n=49):

§ The total is not mutually exclusive

Table 6: Maternal complications among women with cardiac diseases (n=70):

Maternal complications§	No	%
▪ ICU admission	46	65.7%
▪ Tubal ligation	14	20.0%
▪ Heart failure	11	15.7%
▪ Postpartum hemorrhage	8	11.4%
▪ Hysterectomy	5	7.1%
▪ Perineal trauma / vaginal laceration	3	4.3%
▪ Retained placenta	3	4.3%
▪ Rupture uterus	3	4.3%
▪ Pulmonary edema	3	4.3%
▪ Deep venous thrombosis (DVT)	2	2.9%
▪ Cardiac arrest	1	1.4%

§ The total is not mutually exclusive

Table 7: Apgar score, birth weight and neonatal complications (n=70):

		Apgar Score	
Apgar score at the first minute	Mean ± SD	4.1 ± 1.8	
Apgar score at the fifth minute	Mean ± SD	5.7 ± 1.9	
Birth weight			
Very low birth weight	(1.000gm - <1.500gm)	4	5.7%
Low birth weight	(1.500gm - < 2.500gm)	21	30%
Normal birth weight	(2.500gm - 3.500 gm)	45	64.3%
Range		1.200 – 3.500	
Mean ± SD		2635.7 ± 656.7	
Neonatal complications		No	%
▪ Preterm baby		24	34.3%
▪ Admission to NICU		23	32.9%
▪ Need for resuscitation		12	17.1%
▪ Respiratory distress syndrome (RDS)		11	15.7%
▪ Physiological jaundice		4	5.7%
▪ Neonatal death		2	2.9%

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