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Pregnancy outcomes in women with heart disease at the Colonial War Memorial Hospital, Suva, Fiji.

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ABSTRACT

Background: Cardiac disease in pregnancy is the third most common cause of maternal mortality in Fiji. The aim of this study was to determine the characteristics of pregnant women with heart disease presenting to the Colonial War Memorial Hospital (CWMH).

Method: A retrospective review of case notes of all pregnant women identified with heart disease who birthed in the hospital between January 2011 and December 2013 (36 months).

Findings: Of the 24,844 livebirths in CWMH during the study period, 153 women, aged 15 to 43 years of age, were confirmed with a cardiac lesion, which gives a prevalence rate of 6.2 per 1,000 livebirths. Rheumatic heart disease was the commonest cardiac lesion (112, 90%) followed by congenital heart disease (6, 5%) and hypertensive cardiomyopathy (3, 2%). Most of the cardiac lesions (120, 73%) were detected during pregnancy.

There was a higher rate of intervention, morbidity and mortality associated with a cardiac lesion. The rate of instrumental deliveries, caesarean sections and admissions to intensive care were 3.5, 1.5 and 44 times higher compared to pregnant women without a heart lesion. The case-fatality rate was 2.0%.

Conclusion: Women with a cardiac lesion in pregnancy had more interventions, higher morbidity and mortality compared to women without a cardiac lesion. Early diagnosis and evaluation of cardiac function were essential for better maternal outcomes. All pregnant women should be screened with an echocardiogram to improve early detection of cardiac lesions.

Key Words: Cardiac disease, pregnancy, Pacific, Fiji, rheumatic heart disease

BACKGROUND

Congenital and valvular heart diseases in pregnancy have continued to be a leading cause of maternal and neonatal morbidity and mortality worldwide.[1,2,3] Complications were observed in 18% and 17% of women and neonates of women with heart disease compared to 7% and 0% in women without heart disease.[4] The complications in women vary from arrhythmias to heart failure to death whereas for neonates, they can vary from miscarriage to premature birth to neonatal death.

The seriousness of complications can be predicted by the level of maternal risk which is dependent on the cardiac disease diagnosis and condition.[1]

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Several predictors of cardiovascular events in pregnancy have been developed which include the prospective CARPREG study from Canada by Siu *et al*[4] and the retrospective study of women with congenital heart disease by the ZAHARA investigators from Europe.[5]

The CARPREG predictor score has been the most utilised of the risk scores which is based on identified predictors had a high agreement between the expected and observed rate of clinical events. The ZAHARA score had not been validated elsewhere and both the ZAHARA and the CARPREG risk scores are population dependent.(6) In addition, 74% of the CARPREG and 100% of the ZAHARA participants had congenital heart disease and their findings may not be generalizable to populations with a high rate of acquired heart disease, such as those in developing countries.

The burden of cardiac disease in pregnancy is higher in developing countries and disadvantaged populations in developed countries where rheumatic heart disease (RHD) is more prevalent and access to health care is limited.[7,8,9] There remain a large degree of under-diagnosis in developing countries where access to echocardiographic examinations is not consistently available. In the Pacific, studies have estimated the prevalence of subclinical RHD is 8.6-77.8 per 1,000 in school children using echocardiography.[10, 11, 12] Only one study in the Pacific has estimated the prevalence of clinically significant RHD. Relying on amalgamating records from multiple sources and capture-recapture methods, this study estimated a prevalence of 6.5 per 1,000 women.[13] Cardiac related diseases were responsible for five of nine indirect causes of maternal deaths in Fiji between 2008 and 2012.[14]

While cardiac disease is an important cause of maternal morbidity and mortality in Fiji, very little is known about the women and their presentation in pregnancy. The aim of this study is to determine the demographic, clinical details and maternal and neonatal outcomes of the women presenting with cardiac disease to the obstetric department at the Colonial War Memorial Hospital (CWMH) between January 1st 2011 to December 31st 2013.

METHODS:

Retrospective case-notes review of all women who birthed at CWMH from January 1st 2011 through to December 31st 2013 with a diagnosis of cardiac disease.

Women with cardiac disease were identified using the PATIS Patient Information System, maternity registration book, Intensive Care Unit admissions register and the echocardiogram booking register.

The study variables collected were relevant socio-demographic, clinical, and laboratory details from the antenatal clinic and maternal and fetal outcomes at delivery. The variables were entered and collated into an Excel spreadsheet. Each pregnancy was treated as an independent event. Statistical analysis was performed using SPSS (IBM SPSS Version 23). Maternal outcomes were compared to the average rate of outcomes in the general obstetric population seen at CWMH in the same period.

Ethical approval was obtained from the Medical Sciences Research Committee, College Health Research Ethics Committee and the Ministry of Health Research and Ethics Committee (reference number 2014.117.CEN). The study was approved as a research project for the degree of Master of Medicine in Obstetrics and Gynaecology at the Fiji National University.

FINDINGS:

There were 24,844 livebirths (LB) at CWMH January 2011 to December 2013 and 153 women had a diagnosis of cardiac disease which gave a prevalence rate of 6.2 per 1,000 LB.

Characteristics of the women

Of the 153 women, only 124 (81%) case notes could be located and retrieved. Seven women birthed twice during the study time. More than three quarters (84%) of the women were between the ages of 20 to 39 years of age at the time of delivery. For the 124 pregnancy events, the average gestational week at booking was 27.1 weeks and ranged from 6 – 38 weeks. A relationship was found between gravidity and gestation at booking ($X^2(9, N = 124) = 19.19$, $p = 0.019$) with primigravida women booking earlier (**Table 1**).

Types and severity of cardiac disease

The commonest cardiac disease diagnosis made was RHD (112, 90%) (**Table 2**). There were six women with congenital heart disease – two atrial septal defects, two ventricular septal defects, one

Table 1: Characteristics of the women with cardiac disease

Characteristics	n (%)
Age	
<20	6 (5)
20-29	69 (56)
30-39	36 (29)
40-49	12 (10)
Missing	1 (1)
Mean age	25.5
Mode	22
Age range	15 – 43
Ethnicity	
I-taukei	107 (86)
Fijian of Indian origin	15 (12)
Fijian of Other origin	2 (2)
Marital Status	
Married	77 (62)
Partnered	25 (20)
Single/Separated	20 (16)
Employment status	
Yes	30 (24)
No	92 (74)
Not documented	2 (2)
Smoking status	
Smoker	71 (58)
Non-smoker	42 (34)
Unknown	9 (8)
Gravidity	
1	41 (33)
2	39 (32)
3 or more	44 (36)
Gestation at booking	
1st trimester	
2nd trimester	21 (20)
3rd trimester	74 (71)
	9 (9)

tetratology of fallot (TOF) and one with congenital pulmonary hypertension. Cardiac disease was known before pregnancy in 33 (27%) women with the rest first diagnosed during the index pregnancy. In 10 of the 33 known cardiac conditions, the women had undergone at least one surgical treatment prior to the pregnancy. There were three valve repairs, six valve replacements and closure of a TOF.

Table 2: Type of cardiac lesion (N = 124)

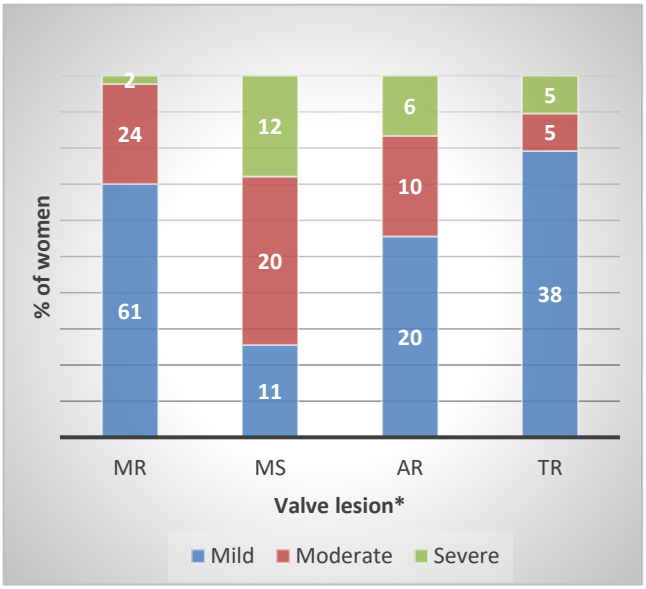
Type of cardiac lesion	No (%)
Rheumatic heart disease	112 (90)
Congenital	6 (5)
Hypertensive	4 (3)
Other valvular disease	2 (2)

Of the 112 women with RHD, 63 (56%) women had mild disease using echocardiogram assessment. Thirty (27%) women had moderate disease and 19 (17%) had severe disease.

Rheumatic Valvular Lesions and Severity

The mitral valve was the most affected valve with mitral regurgitation being the most common lesion.

Figure 1: Severity of RHD using echocardiogram (N = 106/124, 18 missing echo reports).



*MR – Mitral regurgitation, MS – Mitral stenosis, AR – Aortic stenosis, TR – Tricuspid regurgitation. Some women had more than one lesion.

Maternal and neonatal outcomes

The maternal outcomes are listed in **Table 3**, comparing the outcome of women with cardiac lesions with those without. Most of the 33 women delivered by caesarean section were for obstetric indications.

There were 119 (96%) LB in the women with cardiac disease. There were six intensive care admission. There was no neonatal death. Five (5%) of the women had early fetal loss.

Table 3: Maternal outcome comparisons

Outcome	Number (%) with cardiac lesion (N=124)	% women without cardiac lesion (N=24,691)
Preterm Labour	11 (9)	Not available
Assisted Vaginal Delivery	11 (9)	3
Caesarean section	33 (27)	17
Fetal distress	5 (4)	Not available
Post-partum haemorrhage	3 (2)	2
Intensive care admission	6 (5)	0.1

Exacerbating factors

Thirty-two (26%) women had exacerbating factors during the pregnancy. The most common was anaemia (18, 56%) and pneumonia (7, 22%). Heart failure was diagnosed in 28 (23%) women with a cardiac condition. Sixteen (57%) occurred in the antenatal period and 12 (43%) were diagnosed in the puerperium. The 28 women with heart failure had initial echocardiograms showing nine (31%) mild, nine (31%) moderate and 10 (35%) severe disease.

There were three maternal deaths. The women were stable in the antenatal period but decompensated during labour and the postpartum period. Two of the women had undiagnosed severe mitral stenosis and one had cardiac failure from cardiomyopathy as a result of pre-eclampsia. Two of the women booked in the first trimester. The Maternal Mortality Ratio of the general obstetric population was 44 per 100,000 LB during the study period.

DISCUSSION:

The prevalence of cardiac disease in pregnancy in CWMH is 0.62% or 6.2 per 1,000 LB which is comparable to the global rates of 0.5-2%. A recent prospective study in Fiji using echocardiography screening in school students found a definite RHD prevalence of 8.4 per 1,000 LB.[15] A 2011 study found a prevalence rate of 55.2 per 1,000 LB in Lautoka school children,[16] however, this may be falsely high considering the recent clarifications in echocardiographic screening criteria[17] and use of guidelines.[15] The prevalence of congenital heart disease in this population was low compared to populations in developed countries.[18]

Thirty-four (27%) women were known to have cardiac disease before pregnancy and would have benefited from attending a preconception clinic where risks were assessed and quantified and family counseling provided. Seventy (56%) women in our study initiated pregnancy care after 20 weeks gestation especially when they have had babies before. Antenatal education is needed to encourage all women, especially those with increasing parities, to book early. This could potentially involve community nurses, women's groups and church organisations.

Smoking increases the risks of adverse pregnancy outcomes. The majority (58%) of women in this group smoked making it necessary to review the effectiveness of smoking cessation initiatives.

We found that the initial severity of cardiac disease is not a reliable predictor of cardiac complications in pregnancy with 18 women with mild to moderate valvular disease developing heart failure. This is consistent with the findings of other studies.[1]

Nine women had previous cardiac surgery and four of them had metallic valves and anticoagulation. Of the four women, one had an early pregnancy loss and one had a fetal death. The use of anticoagulation is a predictor of neonatal complications.[1]

The percentage of women with exacerbating factors (26%) and heart failure (22%) was higher than that reported by Drenthen *et al*. of 13% and 8% respectively.[5] We found that a good predictor of poor outcome was when the women developed exacerbating factors. These would develop late however and may precede heart failure. As expected, the development of heart failure increased the risk of maternal death.

Our study confirmed the higher rate of interventions in labour required by women with cardiac disease. There was a high intervention rate in instrumental (3.5x higher) and caesarean section (1.5x higher) deliveries and very high use of the intensive care facilities (44x higher). Maternal deaths were high in this group compared to the low-risk population - and may have been even higher without the appropriate care.

CONCLUSION

The high rate of RHD that was undiagnosed pre-pregnancy require better prevention strategies and screening systems in high schools to identify those at risk and treatment with antibiotics initiated. Appropriate pre-pregnancy counseling

and early antenatal booking are essential to assess heart function, severity of disease and initiate interventions to minimise exacerbating factors and complications such as heart failure.

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