

Materno-fetal Outcome and Its Correlation with Modified WHO Class in Women with Heart Disease Referred to Teaching Tertiary Care Centre

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ABSTRACT

Objectives: To evaluate Materno-fetal outcome in pregnancies complicated by heart disease and its correlation with Modified WHO class of maternal cardiovascular risk.

Method: A retrospective analysis was carried on 30 pregnant women with heart disease delivering > 28 weeks over a period of 24 months, at a tertiary level teaching hospital. All women were assigned Modified WHO class and their medical records were reviewed for Materno-fetal outcome and cardiac complications.

Results: The mean age of women was 25.1±3.22 years. RHD (n=22, 73.33%) was the predominant heart disease followed by congenital heart disease (n=5,16.67%) and peripartum cardiomyopathy (n=3,10%). In majority (n=20;66.67%) cardiac problem was first diagnosed during pregnancy. Majority (n=21,70%) of women were in Modified WHO class III/ IV. Eleven (50%) women with RHD had undergone cardiac intervention: PTMC/CMV in 7 and MVR in 4. Two out of these eleven cardiac interventions were carried out successfully during index pregnancy: PTMC in 1 and MVR in 1. Maternal cardiac complications were noted in 7(23.33%) and fetal complications in 16 (53.33%). There was one (3.33%) maternal mortality in postpartum period but there was no perinatal mortality. Women in Modified WHO class II/II-III had statistically significant fewer maternal cardiac complications and preterm deliveries but not statistically significant higher fetal birth weight than those in class III/IV.

Conclusion: RHD was still the predominant heart disease and surgical correction prior to pregnancy was associated with better pregnancy outcome. Women in Modified WHO class II/II-III had a better materno-fetal outcome than those in class III/IV. Majority (91.67%) women needing ICU care belonged to Modified WHO class III/IV

Keywords: Modified WHO class, materno-fetal outcome, Rheumatic heart disease, Acquired heart disease, Congenital heart disease.

INTRODUCTION

Pregnancy in women with heart disease is a high risk pregnancy contributing to 20% of indirect maternal deaths and complicating more than 1% of

all pregnancies.^{1,2} It is also responsible for significant maternal morbidity and intensive care unit (ICU) admission.³ An analysis of maternal mortality between 1987 to 2005 in USA showed that greatest increase in maternal deaths is due to heart disease.⁴ Similarly in UK, maternal mortality due to heart disease between 1997-1999 and 2000-2008 increased from 1.65 to 2.31 per 100,000 births.⁵ This increase is due delayed child bearing and more pregnancies in women with Congenital heart disease(CHD)reaching fertile age due to improved medical care.

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Estimation of maternal risk of Cardiovascular complications in pregnancy including stroke, cardiac failure with pulmonary edema (PE), arrhythmias, worsening of NYHA class is important and ideally should be assessed pre-pregnancy. CARPREG and ZAHARA studies for Acquired heart disease (AHD) and CHD respectively have limitations like they are highly population dependent and important risk factors including pulmonary Artery hypertension (PAH) & unidentified aortic valve are under-represented.^{6,7}

The European Society of Cardiology(ESC) 2011 Task Force Guideline recommends Modified World Health Organization (WHO) risk classification for maternal cardiovascular risk assessment.⁸ The advantage of this risk classification is that it integrates all known maternal cardiovascular risk factors and also includes contraindications for pregnancy. This study was undertaken as in majority studies, materno-fetal outcome was correlated with NYHA functional class and study showing correlation with modified WHO score is not available till date.

MATERIAL AND METHOD

Medical records of 30 pregnancies with heart disease either pre-existing or diagnosed during current pregnancy who delivered at >28 weeks of gestation in the Department of Obstetrics and Gynaecology, Dr. RML Hospital over a period of 2 years from January 2014 to December 2015 were analyzed retrospectively. Baseline maternal data recorded included age, parity, cardiac lesions, prior surgical interventions, cardiac events, co-morbid conditions, NYHA functional class, maternal medications, mode of delivery, period of gestation(POG), fetal weight, ICU admission ,total hospital stay and maternal and fetal complication.

All patients were categorized according to ESC 2011 Task Force Guideline of Modified WHO class based upon type of cardiac lesion and associated mortality risk. Maternal and fetal outcome was analyzed and correlated with their Modified WHO class. Maternal events recorded were PE, arrhythmia, PAH, worsening of NYHA class and maternal death. Fetal outcome noted were preterm birth (<37 weeks gestation), Low birth weight (LBW), RDS, drug embryopathy and perinatal mortality.

Categorical variables were presented in number and percentage (%) and continuous variables were presented

as mean \pm SD and median. Quantitative variables were compared using Independent T-test between the WHO class II/II-II and Class III / IV. A p value of <0.05 was considered statistically significant. The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0.

RESULTS

A total of 30 pregnancies with heart disease who delivered > 28 weeks over a period of 2 years were analysed. Majority were in age group of 25 -29 years (n=17;56.67%) and only two (6.67%) were in the age group 30-34 years and none above 35 years. Mean age of women was 25.1 \pm 3.22 years. Majority (n=16 ,53.33%) of women were primigravida and only two (6.67%) were gravida 3 or more.

Principle cardiac lesion were acquired in 83.33% (n=25) and CHD in 16.67% (n=5). AHD were rheumatic heart disease (RHD) in 73.33 % (n=22) and dilated peripartumcardiomyopathy(PPCM) in 10%(3). In majority (n=20;66.67%) of the women cardiac problem was first recognised during pregnancy, previous pregnancy(9) and current Pregnancy (11). The diagnosis of all PPCM was made in the index pregnancy.

Eleven (50%) of women with RHD who delivered had undergone prior cardiac intervention : PTMC(6),CMV(1) and mitral valve replacement(MVR) (4) . In nine (40.9 %) women surgical intervention was done preconceptionally but in two women, PTMC (1) and MVR (1) was performed in second trimester of concurrent pregnancy. None of the five women with CHD had any cardiac interventions.

All women were categorised according to modified WHO risk class. (Fig 1) Majority (n= 17, 56.67 %) were in to WHO class IV. This category according to WHO risk assessment has maximum maternal morbidity and mortality risk and pregnancy is contraindicated. Four women (13.33 %) were in class III ,20% (n= 6) belonged to class II-III only 10% (n=3) were in class II. None of the women belonged to class I.

Majority (n=16, 53.33%) women had caesarean delivery, twelve had elective caesarean section and four had emergency caesarean section. (Table 1). Majority, 87.5%(14/16) Cesarean delivery were in women in Modified WHO class III/IV.

Nine (30%) women had PAH, secondary to RHD(7) and CHD (2). Eight (26.67%) women were on OAC and one woman who took warfarin throughout pregnancy, had features of fetal embryopathy in her baby.

Majority (n=23, 76.67%) women including all women in Modified WHO class II/II-II (n=9) delivered at term. However, only two third (14/21) of women in Modified WHO class III/IV delivered at term. POG at delivery for women with Modified WHO class II/II-II and class III/IV was 39.13±0.88 weeks and 36.91±2.62 weeks respectively which was statistically significant (p=0.002). [Fig 2] Only one(3.33%) woman who underwent emergency MVR in current pregnancy at 27 weeks in our hospital because of RHD with severe MS with PAH with calcified valve in failure, delivered at <30 weeks

Majority (n=16, 53.33%) of women delivered LBW fetus with mean birth weight (MBW) of 2.42±0.52 Kg. MBW of babies born to women with Modified WHO class II/II-II (2.65±0.33 Kg) was more than in class III/IV (2.33±0.57 Kg) but it was not statistically significant (p=0.063) [Fig 2]. Only 10%(n=3) had VLBW baby <1.5 kg and they were all born to women in Modified WHO class III/IV. There was no stillbirth and early neonatal death. There was no congenital heart anomaly in babies born to women with CHD.

Mean duration of hospital stay for all women with heart disease was 16.83±10.28 and for women with Modified WHO class II/II-II and class III/IV was 13±7.02 days and 18.48±11.14 days respectively which was not statistically significant (p=0.186).[Table 2]

Seven (23.33%) women had cardiac complications: Atrial fibrillation(AF) with worsening NYHA Class (3), Right side failure (2) and PE (2). All these women were in Modified WHO class III/IV and one had undergone MVR in current pregnancy. None had stroke. Twelve (40%) women needed ICU admission for close monitoring with mean ICU stay of 2.83±0.83 days and 91.67%(11/12) of these were in Modified WHO Class III / IV. None of nine women who had undergone cardiac intervention in pre-conceptional period had any cardiac complications.

There was one (3.33%) mortality in women with modified WHO class IV. She was advised LSCS by cardiologist in view of RHD with severe MS with AF and PAH. Post LSCS she was kept in ICU where she

died within 48hrs due to severe PE.

DISCUSSION

Maternal heart disease constitutes major cause of indirect maternal mortality as more and more number of women with CHD in developing countries are able to enjoy motherhood. Though the incidence of RHD has declined in developed countries, it still continues to be a major health problem in developing countries.

In the present study majority (93.3%) women were <30years in contrast to a study from Netherlands where 31% of women were >35 years and 5% >40years.⁹ Bowater and Thorne¹⁰ reported that RHD is frequently diagnosed for the first time in pregnancy, as it exposes underlying heart disease or precipitates symptoms. Same has been observed in our study as 66.67% of cardiac lesion were diagnosed for the first time in pregnancy.

In our study RHD was predominant heart disease in 73.33%, which was in congruence with 68.27%, 70% and 70.37% reported by Doshiet al, Sen et al and Akhtar et al respectively from developing country.^{11,12,13} However, Liu et al in a study of 1741 women observed RHD in only 8.7% as the predominant heart disease was arrhythmia in 38%.¹⁴

In the present study AF, PE and PAH developed in 10%, 6.67% and 30% of the women respectively. However, Indira et al¹⁵ observed a lower rate of 6.66%, 3.33% and 16.66% respectively. Similarly Jastrow et al¹⁶ reported cardiac complications rate of 7.4% in 312 pregnancies which is much lower than 23.33%(7/30) in the present study. This may be because majority (70%) in our study were referred cases with Modified WHO class III/IV.

Gandhi and Martin¹⁷ have also reported that PE and dysrhythmias are most commonly encountered cardiac events which is in congruence with our study. Subbaiah et al¹⁸ observed cardiac complications in 32% women which was similar to 23.33% in our study. But fetal complications reported were 18% which was much lower to 53.33% in our study. In their study, 11.76%(2/17) of the newborns of the women who had received OAC had features of warfarin embryopathy which was very similar to 12.5%(1/8) seen in our study. Because of close antenatal surveillance and improved NICU facility at our institute there was no perinatal mortality.

In our study, 30% (n=9) had cardiac intervention preconceptionally which was higher than the study by Liu et al¹⁹ in which 12.7% women had pre-pregnancy cardiac operation and similar to our study majority (90.3%) of them remained in NYHA Class I-II with better materno-fetal outcome. In our study one women had successful MVR at 27 weeks of pregnancy and same was reported by Dogan et al²⁰ at 38 wks of pregnancy.

In the present study 87.5% (14/16) caesarean section were done in women in Modified WHO class III/IV. This is in congruence with study by Duarte et al²¹ in which there was 100% caesarean rate in their high risk women having PAH. Advantages of elective Caesarean section is that it avoids prolonged labour with controlled a naesthesia with hemodynamics optimization and proper contingency plans without negatively affecting the outcome.

In our study, birth weight in women with Modified WHO class II/II-III compared to class III/IV was much higher (2.65±0.33kg vs 2.33±0.57kg; p value 0.063). Similarly, Liu et al¹⁹ in their study found a significant higher birth weight of babies born to women in NYHA I as compared to those in NYHA IV (3.2+ 0.46kg vs 2.4+ 0.75kg)

In our study 40% women needed ICU admission and majority (11/12, 91.67%) were in women in Modified WHO Class III / IV. Small et al³ in congruence had reported that maternal cardiac disease was responsible for highest (36%) ICU admission in near miss maternal mortality.

All cardiac complications and maternal death in our study were in women in Modified WHO class III/IV. Akhtar et al¹² similarly observed that PE (8.35%) and arrhythmias (15.03%) developed only in 24% women in NYHA class III/IV. Duarte et al²¹ in their study on 12 women with PAH observed mortality rates of 16.7% (2/12) which was in correlation with 11.11% (1/9) reported in our study. Nagamani et al, Nayak et al, Puri et al, Ashwin & Devi, Sen et al and, Indira et al reported maternal mortality rate of 5%, 3.33%, 3%, 3.33%, 7.5% and 0% respectively which is in congruence with mortality rate of 3.33% in our study.^{22-25,12,15}

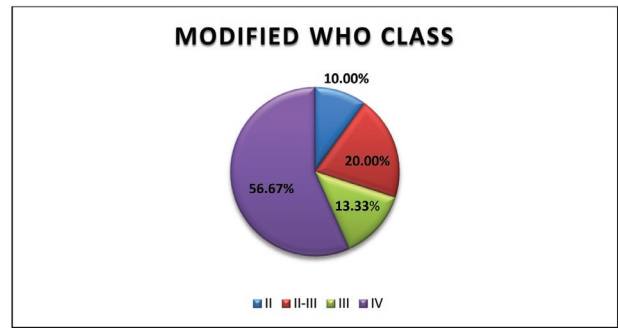


Fig 1: Distribution according to modified WHO class

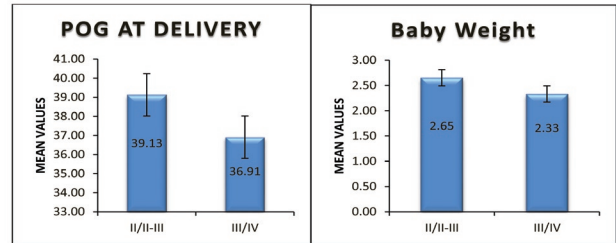


Fig2: Correlation of POG and birth weight with modified WHO class

Table 1: Mode of Delivery

MODE OF DELIVERY	Frequency
Vaginal delivery	14
a. Spontaneous	13
b. Induced	1
Cesarean Section	16
a. Maternal Indication	6
b. Fetal Indication	5
c. Obstretical Indication	5
Total	30

Table 2: Statistical Correlation of outcome with Modified WHO class

PARAMETER	WHO CLASS II/II-III	WHO CLASS III/IV	P value
BIRTH WEIGHT			0.063
Mean ± Stdev	2.65 ± 0.33	2.33 ± 0.57	
Median	2.66	2.4	
Min-Max	2.2-3.34	1.26-3.09	
DURATION OF HOSP STAY			0.186
Mean ± Stdev	13 ± 7.02	18.48 ± 11.14	
Median	9	17	
Min-Max	5-24	5-51	
POG AT DELIVERY			0.002
Mean ± Stdev	39.13 ± 0.88	36.91 ± 2.62	
Median	39.29	37.86	
Min-Max	37.29-40.14	29.86-39.57	

CONCLUSIONS

RHD was predominant lesion and pregnancy was well tolerated in whom surgical correction was done prior to embarking on pregnancy. Hence, all women with heart disease should discuss need for cardiac surgery preconceptionally in order to optimise their cardiac condition. Women in modified WHO class II/II-III had fewer maternal cardiac complications and lesser PTL and ICU stay with better fetal birth weight than those in class III/IV. Hence, the cornerstones of management of women with heart disease are pre-pregnancy counselling and risk assessment, management in a tertiary care hospital, individualization of treatment and multidisciplinary approach .

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Compliance with Ethical requirement – Yes

Conflict of Interest - Nil

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