

RISK SCORING AND OUTCOME IN PREGNANT CARDIAC PATIENTS IN A PERIPHERAL TERTIARY CARE CENTRE

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ABSTRACT

Objectives: To determine types of cardiac lesions in pregnant patients according to World Health Organization (WHO) cardiac risk score and to observe frequency of fetomaternal complications.

Study Design: Prospective longitudinal study.

Place and Duration of Study: This study was conducted at obstetrics and gynecology unit of Combined Military Hospital Kharian from Dec 2017 Dec 2018.

Methodology: All consecutive diagnosed pregnant cardiac patients and also recently diagnosed patients were enrolled. Estimation of maternal risk associated with pregnancy was done by classifying the patients according to the modified World Health Organization scoring system. Primary outcome was frequency of patients identified by risk scoring systems and types of lesions. Patients were followed up for the duration of pregnancy and puerperium for fetomaternal complications. Frequency of maternal morbidity and mortality due to cardiac complications was calculated.

Results: A total of 52 patients were enrolled. Mean age was 28.9 ± 4.9 years. Cardiac events complicated (38.8%) of pregnancies and there were 11(6.4%) obstetric and (37%) neonatal complications. The aetiology of maternal cardiac lesions was acquired, 30 (57.6%), congenital 12 (23.0%) and rhythm disorders in 10 (19.2%) Cardiac maternal deaths were 03 (2.4%) and there were no obstetric deaths. Prediction of cardiac complications by the scoring systems was significant as in WHO I risk was 12% rising to 100% in WHO IV.

Conclusion: The modified WHO risks score is well adjusted to predict cardiac complications. Triage of the patients according to this standardized score in peripheral hospitals will lead to timely referral of patients who score high and likewise giving confidence to deliver low risk cardiac patients at mid-level hospitals.

Keywords: Cardiac disease, Cardiac risk scoring, Pregnancy.

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INTRODUCTION

Heart disease prevalence during pregnancy is estimated to be 1-3%¹. In western world during pregnancy maternal death due to cardiovascular disease is very common. Developing countries are still struggling with rheumatic fever and acquired valvular cardiac disease whereas congenital heart disease is the main diagnostic group in developed countries. Recently, during pregnancy prevalence of acute coronary disease has increased because of hypertension, maternal age, smoking, and obesity². The main causes of direct maternal deaths in developing countries including Pakistan are hemorrhage, hyperten-

sion, sepsis and miscarriage related complications. But of the indirect causes cardiac disease is the main contributor globally³. Pregnancy poses a major hemodynamic burden so risk of developing complications is increased as compared to normal population. These patients represent a unique group with risk for adverse outcome during pregnancy like heart failure, aortic dissection, arrhythmias, and thrombo-embolic events⁴. Women had history of cardiac disease in order to reduce these risks full pre-pregnancy or early pregnancy risk assessment and counseling is important. Interventions need to be done before pregnancy if required, and a proper plan should be apt, which might include prevention of pregnancy for high risk lesions. In addition to management for the duration of antenatal phase instance and type of delivery can be

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individualized according to risks and decided upon jointly by obstetrician, cardiologist and obstetric anesthesiologist⁵. In pregnant woman the process of diagnosing cardiac disease is challenging as many signs and symptoms of normal pregnancy mimic cardiac disease and can be missed considering them normal phenomenon. History and examination along with echocardiography is safe for mother and fetus in diagnosing and severity assessment⁶.

Many cardiac risk scoring systems have been established for pregnant patients to predict adverse outcome and risk score's calculation ought to be a component of pre pregnancy risk estimation. Few English experts proposed a plan that incorporates all accessible information and data of pregnant females. The World Health Organization (WHO) assesses the association of cardiovascular problems with maternal risk of pregnancy⁷. It is advocated in the new European Society of Cardiology (ESC) strategy for organizing cardiovascular problems throughout pregnancy is the preferred risk assessment system of preference⁸. According to WHO classification, four groups are made for pregnancies i.e. WHO Classes I, II, III and IV, which represent low to high risks of cardiac disease in pregnancy. According to these categorized classes patients of WHO class I & II were advised to visit once in trimester and less and for women belongs to WHO class III & IV were advised to visit on monthly or bimonthly basis.⁹ Not all cardiac patients require delivery in a dedicated cardiac care facility. If obstetricians carefully assess the patients for risk of adverse outcome, unnecessary referrals causing psychological and financial trauma to patients can be avoided. There is also unnecessary burden on the facility which is supposed to cater for high risk patients, creating logistic problems. Diagnosis of cardiac disease evokes fear amongst care providers and patients both and due to lack of awareness either the patients are missed and precious lives are lost or are referred without a valid reason. If the patients are triaged according to a validated risk scoring system this can be addressed and majority of low

risk cardiac patients can be delivered in peripheral tertiary care centers without need for a dedicated tertiary care cardiac facility with comparable fetomaternal outcomes.

This study was done to observe types of lesions and classify patients according to risk score to decide their place and plan of management and to observe frequency of maternal complications in study cohort.

METHODOLOGY

This was a prospective longitudinal study done in combined military hospital Kharian, Pakistan from December 2017 to December 2018. Approval for conducting the study was taken from institutional review board and 52 patients were recruited in this study by purposive non probability consecutive sampling technique. All consecutive cardiac patients during pregnancy and peripartum having structural and congenital lesions, rhythm disorders, cardiomyopathy and ischemic heart disease were included. The exclusion criteria included miscarriages and termination of pregnancy.

Written Informed consent for data collection was taken. Already diagnosed and Symptomatic patients were investigated by taking detailed history and examination. Age, parity, gestational age at delivery, mode of delivery, New York Heart Association (NYHA) class, cyanosis (oxygen saturation $\leq 90\%$), prior cardiac events, cardiac lesions and prior surgery/interventions were noted. Investigations included 12-lead ECG and transthoracic echocardiography assessment of cardiac status. Assessment of maternal cardiac risk factors related with pregnancy has done by categorizing the patients in to recent adapted WHO (World Health Organization) scoring system. Primary outcome was frequency of patients identified by risk scoring systems and types of lesions. Patients in WHO group 1-3 were mostly managed in this hospital. High risk patients 3-4 were referred to dedicated tertiary care cardiac centre with obstetric facilities. Frequency of cardiac complications was noted. The definition of primary cardiac events is as pulmonary edema

predicted on chest radiograph or by crackles heard over more than one-third of posterior lung fields, sustained symptomatic tachy or bradycardia required treatment, heart failure requiring treatment, endocarditis identified by standard criteria, thromboembolic phenomenon (stroke, pulmonary embolism, deep venous thrombosis,

2160 (2.4%) total births. Demographic profile showed mean age 28.3 ± 4.3 years, mean parity was $P2 \pm 1.2$, gestation at delivery was 36 ± 4.8 . Booked patients were 34 (65.3%) and 18 (34.6%) were unbooked. Functional status of patients was determined and 8(15.3%) were in NYHA classification class 1, 30 (57.6%) class 2, 9 (17.3%) class

Table-I: Cardiovascular WHO Risk score and complications.

WHO Score	No. of Patients	Cardiac complications	Maternal mortality
WHO1	8 (15.3%)	1 (12%)	0
WHO 2	10 (19.2%)	3 (30%)	0
WHO2-3	16 (30.7%)	3 (19%)	0
WHO3	12 (23.07%)	7 (58%)	0
WHO 4	6 (11.5%)	6 (100%)	3 (5.7%)
Total	52	20 (38%)	3 (5.7%)

valve thrombosis), acute coronary syndrome, require for urgent invasive cardiac procedures through pregnancy or within 6 weeks after cardiac arrest, delivery or cardiac death.

Secondary outcomes were obstetric fetomaternal complications. Neonatal events were de-

3 and 5 (9.6%) class 4. Of the study patients 30 (57.6%) were diagnosed to have heart disease prior to pregnancy, however in the rest 22 (42.3%) diagnosis was made primarily during their present pregnancy.

The aetiology of maternal cardiac lesions

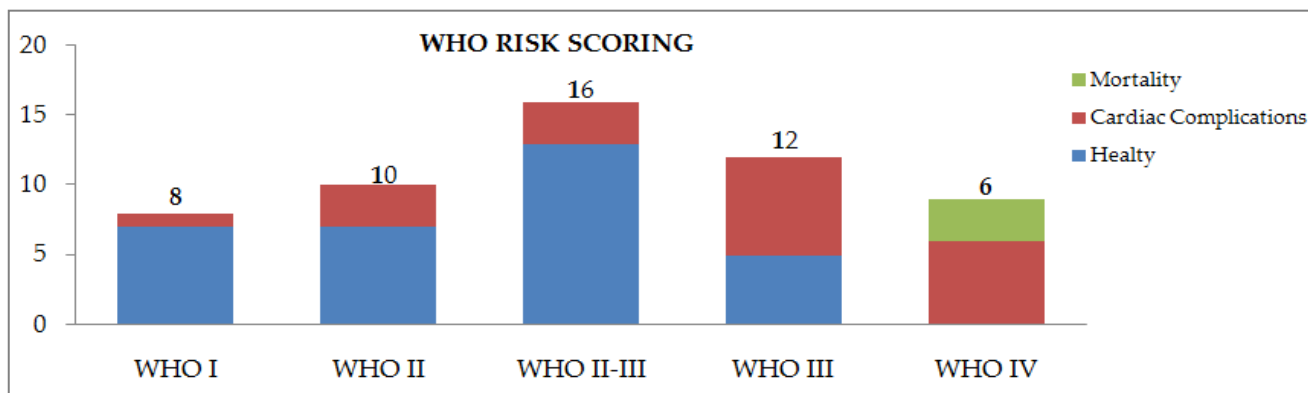


Figure: Cardiac complications and mortality in cardiovascular WHO risk score patients.

defined as premature birth (≤ 37 weeks gestation), fetal growth restriction ($< 10^{\text{th}}$ percentile), fetal death (> 26 weeks of gestation) or neonatal death (within 28 days after delivery). Data was collected and analyzed using SPSS version 23. Quantitative data was measured by Mean \pm SD and Frequency & percentages.

RESULTS

Total 52 patients were enrolled in our study, out of total 24,000 (0.21%) obstetric patients and

was acquired in 30 (57.6%), congenital 12 (23.0%) and rhythm disorders in 10 (19.2%) patients. Cardiac events complicated 20 (38.8%) of pregnancies. There were 04 (7.6%) obstetric and 19 (36.5%) neonatal complications. Out of all patients 24 (46%) delivered by spontaneous vaginal delivery, 8 (15.3%) instrumental delivery and 20 (38%) by cesarean section. Most cesarean sections were for obstetric indications 16 (80%) and cardiac disease was indication in 4 (20%) patients. The modified WHO risk score is better

adjusted to predict cardiac complications which increased in frequency as the score increased as shown in table-I. There were varieties of cardiac lesions amongst study population which were classified by WHO Risk scoring as shown in table-II. Cardiac complications were seen in 20 (38.4%) patients out of which majority patients developed congestive cardiac failure 07 (35%), arrhythmia 05 (25%), pulmonary edema 2 (10%),

precarious condition and could not be referred or stabilized due to their critical condition.

DISCUSSION

Internationally 10-15% of all maternal mortality is due to cardiovascular disease¹⁰. Depending on severity and type of disease, magnitude of the risk of cardiac problems in pregnancy varies. However, in a developing country like ours,

Table-II: Frequency of types of cardiac lesions according to WHO Risk Scoring.

Types of lesions	N=52
WHO I	
Uncomplicated small or mild Pulmonary stenosis	0
Patent ductus arteriosus	1
Mitral leaflet prolapse	1
Successfully Repaired ASD, VSD, PDA	2
Atrial/ventricular ectopic beats	4
WHO II (otherwise well and uncomplicated)	
Unoperated ASD, VSD	1
Repaired tetralogy of Fallot	1
Most arrhythmias	8
WHO II-III (depending on individual)	
Mild left ventricular impairment	1
Hypertrophic cardiomyopathy	0
Native or tissue valvular heart disease not considered WHO I or IV	15
Marfans syndrome without aortic dilation (Aorta <45mm in aortic disease associated with bicuspid aortic valve)	0
Repaired coarctation	0
WHO III	
Mechanical valves	10
Systemic right ventricle	0
Fontan's circulation	0
Cyanotic heart disease-unrepaired	1
Complex congenital heart disease	1
Marfans syndrome with aortic dilatation 4-45mm, Aortic dilatation 45-50 mm in aortic disease with bicuspid valve	0
WHO IV (pregnancy contraindicated)	
Pulmonary arterial hypertension	1
Severe ventricular dysfunction	3
Previous peripartum cardiomyopathy	0
Severe Mitral Stenosis/Aortic stenosis	2
Marfans syndrome >	0
Severe coarctation	0

thromboembolism 02 (10%), cardiac interventions during pregnancy like cardioversion, PTMC and cardiac surgery 01 (5%) was noted in a few. There were three (5.7%) maternal mortalities due to cardiac failure and all the mortalities were in WHO IV patients who came to the hospital in

many cases are missed owing to lack of awareness. Also majority population lives in rural areas where health care facilities are either inappropriate or inadequate. This poses an additional risk for such high-risk patients in whom either the diagnosis is not made accurately or diagnosis

is made at such a level where the clinical condition of the patient has already deteriorated owing to the severity and type of cardiac lesion. The maternal and perinatal outcome in such high-risk patients can be enhanced by adequate risk assessment and counseling. In this study, we have analyzed the main risk factors of cardiac lesion in pregnant women with cardiac disease so as to justify the use of an established risk assessment system. Pregnancy in patients having cardiac issues cause 100 times higher rate of maternal mortality as compared to normal pregnancy¹¹. Mean age of our study population was 28 ± 4.9 years which was similar to other studies^{12,13}. Cardiac lesions were predominantly 57.6% valvular, followed by congenital 23% and 19% rhythm disorders. These results are similar to other studies done here in Pakistan 14 but congenital lesions were predominant in studies done in western world with frequency of 74% and 66% congenital lesions followed by 22% and 28% acquired lesions^{15,16}. Frequency of cardiac complications was 38%, obstetric 7.6% and 36.5% neonatal complications which were higher than a study done by sameul *et al* which reported complications as 17% cardiac, 20% neonatal and 2% obstetric¹⁷. Adverse cardiac and neonatal outcome are more common in these patients as was demonstrated by a study which had normal pregnant patients as control. In this study 17% had cardiac complications and 18% neonatal complications compared to 0% amongst controls¹⁸. Cesarean section was mode of delivery in 38% patients, 11.5% for cardiac indication whereas another study reported 27% cesarean section and 4% only for cardiac indication¹⁹. In ROPAC study cesarean section rate was 41%. Maternal mortality was 1% and highest was in patients with cardiomyopathy unlike in this study in which leading cause was acquired valvular lesions²⁰. Nature of cardiac, obstetric and perinatal complications was similar. Commonest cardiac complications were cardiac failure and arrhythmias. Rate of cardiovascular disease in our setup was high as compared to other studies²¹. However, it was lower than the Indian study²². This difference may be

due to the clinical characteristics of patient, heart disease severity, maternal heart problem, pre-pregnancy operation, medical treatment followed, socio-economic class and the type of heart disease. European Society for Cardiology guide lines and some new studies demonstrate WHO score as the more valid score in comparison to Carpeg and Zahara which have limitations like both fail to identify pulmonary hypertension^{23,24}. Even in our population which constitutes predominantly of rheumatic heart disease patients in contrast to majority congenital lesions in western studies it fared well. In this study, approx 34% of patients belongs to WHO class-III & IV. The percentage of cardiovascular problems in WHO class-III & IV was considerably in upper limit, while they were 12% in class I and 100% in class IV. According to latest study of Italy, which demonstrates higher complication in higher WHO classes, i.e. 5% in class I & II and then 31% in WHO class-III & IV²⁵. As shown in many previous studies, heart failure is considered to be the most frequent complication of cardiac lesions²⁶. In WHO classes I to IV, the cardiac disease frequencies and the NYHA classes' deterioration was increased progressively.

Limitation of this study is that it is a single centre study hence cannot be generalized to population as predictors and risk scores are highly population dependent.

Major contribution of our study is gaining confidence in using WHO modified score in our population and comparable results to international studies. This validated triage system can be used with confidence in deciding further management plan and referral when required.

CONCLUSION

According to our findings, majority of pregnant patients having cardiac lesions faced no or few complications. Proper timely counseling sessions and risk estimation is necessary to safe the pregnancy of cardiac patients and it increases the chances of safe pregnancy. Pre-pregnancy assessment include, complete laboratory profile, physical examination, and ECHO (echocardi-

graphy) is necessary, which helps in classifying high risk cardiac patients and to set proper mechanism to reduce the risk of complications. In all our hospitals as a health care initiative, it is very important to implement or initiate the proper strategy to measure cardiovascular risk assessment of pregnant patients in accordance to latest WHO guidelines. Early referral of high risk pregnant patients having cardiac issue need to be assessed timely and treat at a tertiary cardiac care center by a trained team is a significant factor in achieving healthy pregnancy outcomes and it will help in reducing maternal morbidity and mortality.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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