Original Article

Complications of pregnancy among Women with Congenital Heart Disease

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ABSTRACT

Introduction: *Congenital heart disease (CHD) represents a significant challenge for pregnant women due to the increased hemodynamic demands of pregnancy. Pregnancy in such cases poses an elevated risk of adverse events, including heart failure, arrhythmias, and thromboembolic events. Maternal complications can lead to increased maternal morbidity and mortality.* ***Aim of the study:*** *This study aimed to analyze the complications experienced by pregnant women with congenital heart disease with a specific focus on maternal and fetal outcomes.* ***Methods and materials:*** *This was an observational study that was conducted in the Combined Military Hospital (CMH) Dhaka, Bangladesh from January 2020 to December 2021. In total 30 pregnant women with congenital heart disease were enrolled in this study as the study subjects. A convenient purposive sampling technique was used in sample selection. All data were processed, analyzed, and disseminated by using MS Office tools.* ***Results:*** *In this study, obstetric complications included pre-eclampsia (10%), placenta previa (3%), placental abruption (3%), and hemorrhage (7%), while pre-term delivery affected 17% of pregnancies. Fetal complications comprised foetal distress (10%), foetal growth restriction (7%), foetal malformations (20%), neonatal death (7%) and foetal stillbirth in 2 cases (7%).* ***Conclusion:*** *Pregnant women with congenital heart disease often face common obstetric*

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complications like pre-eclampsia, placenta issues, and bleeding. Premature births and prolonged pregnancies add to the challenges. Fetal complications include distress, growth issues, and malformations, reflecting the complexity of these pregnancies; some cases result in fetal stillbirth and neonatal death.

Keywords: *Complications, Pregnant, Congenital heart disease, CHD, Foetal, Obstetric*

INTRODUCTION

Development in the fields of surgical intervention and diagnostic techniques has dramatically upgraded long-term outcomes in patients with congenital heart disease (CHD). As a consequence, most patients with congenital cardiac malformations reach reproductive age. Many of these women hope to become pregnant. Pregnancy that one is a circulatory burden, primarily due to volume loading, which has an impact even on a healthy female's life. In the face of residual lesions or sequelae next correction or an in-corrected maternal congenital heart defect, this burden may have deleterious effects on the health of both the mother and her offspring. Cardiac, obstetric, and neonatal complications all appear to be more prevalent [1]. Limitations of the score for patients with CHD are that it is developed based on a cohort that included patients with primary electrical disease and acquired heart disease [2]. Besides, several types of (mainly complex) CHD were underrepresented [3]. It is suggested that the CARPREG cardiac risk score, therefore, needs to be modified to evaluate the risk of pregnancy in women with CHD [4]. The number of deliveries to women with CHDs increased by 34.9% over 10 years from 1998 to 2007, a greater rise than the 21.3% increase observed in the general population [5]. Due to the increased burden placed on the mother's cardiovascular system, women with CHD are more likely to experience heart failure, stroke, arrhythmias, and myocardial infarction [6,7]. Children born to women with CHDs are also placed at a higher risk for several adverse outcomes, including small for gestational age, premature birth, and reoccurrence of CHDs or other congenital anomalies [8]. Pregnancy induces hemodynamic changes, which can be poorly tolerated in women with a congenital heart defect. Even though maternal mortality is very infrequently reported, maternal and neonatal or fetal complications are far more important numerically [9]. Predictive factors used for these complications have been identified, and specific risk scores can identify pregnancies with a higher risk [World Health Organization classification] [10]. After suicide, cardiac disease is now the leading cause of maternal death in the UK, with most of these casualties having had congenital heart disease[11]. The objective of this current study was to analyze the complications experienced by pregnant women with congenital heart disease, with a specific focus on maternal and fetal outcomes.

METHODS AND MATERIALS

This observational study was conducted at Combined Military Hospital (CMH) Dhaka, Bangladesh, spanning from January 2020 to December 2021. The research involved a total of 30 pregnant women diagnosed with congenital heart

disease (CHD) as subjects. The sample selection utilized a convenient purposive sampling technique and had prior approval from the hospital's ethical committee. Written consent was diligently obtained from all participants, adhering strictly to the ethical principles outlined in the Helsinki Declaration and following applicable regulations, including the provisions of the General Data Protection Regulation (GDPR) [12,13]. Baseline information, including maternal age, cardiac diagnosis, history of surgical or percutaneous interventions, co-morbidities, body mass index (BMI), medication usage, and awareness of CHD, was meticulously recorded. Maternal cardiovascular risk assessment was conducted using a modified World Health Organization (WHO) score [14]. Additionally, comprehensive data on pregnancy, obstetric history, age at conception, spontaneous and elective abortions, cardiac, obstetric, and fetal/neonatal complications, hospitalizations during pregnancy, the initial planned and final method of delivery, as well as clinical status at the 6-month post-pregnancy mark, were documented. Subsequently, the collected data underwent processing, analysis, and dissemination using MS Office tools.

RESULT

In this study involving 30 participants, the mean age was 21.5 years, with the majority falling within the 19 to 24 years age range. Notably, 90% of the participants had a history of prior surgical repair, underlining their significant medical background. Hemoglobin levels varied from 12 to 16.8 gm/dL, with an average of 13.8 gm/dL, while oxygen saturation levels consistently measured high at 96.60%. In terms of functional class as per NYHA classification, 83.33% of participants were categorized as class II, indicative of mild symptoms, while the remaining 16.67% were classified as class III, indicating moderate symptoms **(Table I)**.

Table I: Baseline characteristics of participants (N=30)

Clinical status	Mean/n (%)
Age (Year)	21.5 (19-24)
Previous surgical repair	27 (90%)
No previous surgical repair	3 (10%)
Haemoglobin (gm/dL)	13.8 (12-16.8)
Oxygen saturation (Sat%)	96.60%
Functional class (NYHA) (%)	II-25 (83.33%)
	III-5 (16.67%)

The study found that 7 participants (23.35%) had an atrial septal defect (ASD), all of whom had undergone surgical repair. Five participants (16.68%) had a ventricular septal defect (VSD), with 2 of them receiving surgical intervention. Eight participants (26.69%) experienced a patent ductus arteriosus (PDA), typically managed through ligation and trans fixation. Tetralogy of Fallot (TOF) was present in 6 participants (19.98%), all of whom had undergone repair. Additionally, 3 participants (9.99%) had pulmonary stenosis (PS), all treated with repair, and 1 participant (3.33%) had congenital aortic stenosis, also treated with repair **(Table II)**.

Table II: Distribution of cardiac defects (N=30)

Defects	n	%	Repair technique
ASD	7	23.35%	All repaired
VSD	5	16.68%	2 repaired
			3 not repaired
PDA	8	26.69%	Ligation and TF
TOF	6	19.98%	All repaired
PS	3	9.99%	All repaired
CAS	1	3.33%	Repaired

ASD: Atrial septal defect,
VSD: Ventricular septal defect,
PDA: Patent ductus arteriosus,
TOF: Tetralogy of Fallot,
PS: Pulmonary stenosis,
CAS: Congenital aortic stenosis,
TF: Trans fixation

These findings provide a comprehensive overview of the study cohort's demographic and medical characteristics. In this study, obstetric complications were observed, with notable findings including pre-eclampsia occurring in 10% of cases. Additionally, placenta previa and placental abruption were less common, affecting 3% and 3% of participants, respectively. Hemorrhage was observed in 7% of cases, while pre-term delivery was a significant concern, with 17% of pregnancies ending prematurely **(Table III)**.

Table III: Obstetric complications (N=30)

Obstetric events	n	%
Pre-eclampsia	3	10%
Placenta previa	1	3%
Placental abruption	1	3%
Hemorrhage	2	7%
Pre-term delivery	5	17%

These findings underscore the importance of closely monitoring and managing obstetric complications in pregnant women with CHD to ensure optimal maternal and fetal outcomes. In this study, foetal distress was noted in 10% of cases, while foetal growth restriction affected 7% of pregnancies. Alarmingly, foetal malformations were present in 20% of cases, highlighting a significant concern. Additionally, 2 cases (7%) resulted in foetal stillbirth and 2 cases (7%) in neonatal death **(Table IV)**.

Table IV: Foetal complications (N=30)

Fetal events	n	%
Foetal distress	3	10%
Foetal growth restriction	2	7%
Foetal malformation	6	20%
Foetal stillbirth	4	7%
Neonatal death	2	7%

DISCUSSION

This study aimed to analyze the complications experienced by pregnant women with congenital heart disease with a specific focus on maternal and fetal outcomes. In this study, the mean age of the participants was 21.5 years, with the majority falling between 19 and 24 years old. Notably, 90% had undergone previous surgical interventions, indicating their medical history. Hemoglobin levels ranged from 12 to 16.8 gm/dL, with an average of 13.8 gm/dL, while oxygen saturation consistently remained high at 96.60% (Table I). In a similar study, participants had a mean age of 27.7±6.1 years, and their mean oxygen saturation (%) was found to be 98.6±0.9% [15]. In this study, in

terms of functional class as per NYHA classification, 83.33% of participants were categorized as class II, indicative of mild symptoms, while the remaining 16.67% were classified as class III, indicating moderate symptoms. Specifically, the study found that 7 participants (23.35%) had an atrial septal defect (ASD), all of whom had undergone surgical repair. Five participants (16.68%) had a ventricular septal defect (VSD), with 2 of them receiving surgical intervention. Recent data on long-term outcomes following surgical closure of simple lesions, such as atrial septal defects, have demonstrated good to excellent long-term survival [16]. This study identified various obstetric complications. Notably, pre-eclampsia was observed in 10% of cases, while placenta previa and placental abruption were less frequent, affecting 3% of participants each. Hemorrhage occurred in 7% of cases, and pre-term delivery was a significant concern, affecting 17% of pregnancies, and ending them prematurely. In a study conducted by Ruys et al., pregnant women with structural heart disease, including those with congenital heart defects (CHDs), exhibited a heightened risk of pre-eclampsia along with heart failure when compared to individuals without structural heart disease [17]. Furthermore, Hayward et al. discovered that women with noncomplex CHDs experienced significantly elevated odds of developing pre-eclampsia or eclampsia [18]. In this study, foetal distress was documented in 10% of cases, while foetal growth restriction impacted 7% of pregnancies. Of notable concern, foetal malformations were identified in 20% of cases, underscoring a significant issue. Furthermore, two cases (7%) resulted in foetal stillbirth and two cases (7%) in neonatal death, emphasizing the gravity of the situation. These findings emphasize the need for vigilant monitoring and specialized care during pregnancy for women with CHD to address and mitigate potential fetal complications, ensuring the best possible outcomes for both mother and child. A study investigated various fetal complications, which encompassed fetal malformation, fetal distress, fetal death or stillbirth, and fetal growth restriction as points of interest [19].

LIMITATION OF THE STUDY

This was a single-centered study with small-sized samples. Moreover, the study was conducted over a very short period. So, the findings of this study may not reflect the exact scenario of the whole country.

CONCLUSION & RECOMMENDATION

For pregnant women with congenital heart disease, pre-eclampsia, placenta previa, placental abruption, and hemorrhage are very common obstetric complications, underscoring the need for vigilant monitoring and management. Additionally, a substantial proportion of pregnancies end prematurely, emphasizing the challenges faced by pregnant women with congenital heart disease. In terms of fetal complications, the study highlights instances of foetal distress, foetal growth restriction, and foetal malformations, further emphasizing the complex nature of these pregnancies. Moreover, the occurrence of foetal stillbirth and death in a notable number of cases serves as a poignant reminder of the importance of specialized care for both maternal and fetal well-being in this population.

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CONFLICT OF INTEREST
None declared

ETHICAL APPROVAL
The study was approved by the Institutional Ethics Committee

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