

Outcomes of Pregnancies in Women with Congenital Heart Disease: A Study in a Tertiary Care Hospital in Bangladesh

Hasina Akhter¹, Nahid Reaz Shapla², Kamrun Nahar³

1. Hasina Akhter
Classified Specialist
Department in Obstetrics and Gynecology
Combined Military Hospital
Mymensingh, Bangladesh
2. Nahid Reaz Shapla
Advisor Specialist & Head
Department of Obstetrics and Gynecology
Combined Military Hospital
Dhaka, Bangladesh
3. Kamrun Nahar
Classified Specialist
Department in Obstetrics and Gynecology
Combined Military Hospital
Tangail, Bangladesh

Correspondence to:

Hasina Akhter
Classified Specialist
Department of Obstetrics & Gynaecology
Combined Military Hospital
Mymensingh, Bangladesh
E-mail:zariffarhan@gmail.com



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Abstract

Background:

Pregnancies in individuals with congenital heart disease (CHD) frequently pose complex challenges. The presence of CHD elevates the risks not only for the expectant mother but also for the well-being of the developing fetus. Additionally, careful monitoring and specialized medical care are crucial throughout the pregnancy to ensure the best possible outcomes for both.

Objective:

This study was aimed to assess the outcomes of pregnancies in women with congenital heart disease.

Methods:

This was a cross-sectional observational study that was conducted in the Combined Military Hospital (CMH), Dhaka, Bangladesh from January 2020 to December 2021. A total 30 pregnant women with congenital heart disease were enrolled through purposive sampling. All the demographic and clinical information was recorded. Data were processed, analyzed, and disseminated by using MS Office tools.

Results:

Among participants, Lower Segment Cesarean Section (LSCS) was the most common delivery (43.3%), followed by vaginal delivery (36.7%). Instrumental delivery, specifically through outlet forceps, was found in 6.7% of cases. Pregnancy termination occurred in 6.7% due to inevitable abortion and 3.3% for medical reasons, resulting in one maternal death (3.3%). Perinatal outcomes included 90% live births and 81.5% with Apgar scores ≥ 9 . Neonatal Intensive Care Unit (NICU) admission was required for 33.3%, with a 3.3% perinatal death rate.

Conclusions:

In pregnant women with congenital heart diseases, common delivery modes are Lower Segment Cesarean Section (LSCS) and vaginal delivery. Termination and maternal fatality rates are low. Perinatal outcomes are generally positive, with most births resulting in live infants with Apgar scores ≥ 9 and high newborn survival rates, although some require Neonatal Intensive Care Unit (NICU) admission.

Keywords: Congenital heart disease, Pregnancy, ASD, VSD, Outcomes, PDA

Introduction:

Pregnancy is an extraordinary and transformative life event for nearly every woman and for women living with congenital heart disease (CHD), this pivotal journey is accompanied by heightened risks that necessitate specialized attention¹. Among the most prevalent complications that can manifest during pregnancy in these women are heart failure, arrhythmias, bleeding, thrombosis, and pulmonary hypertension. On the fetal side, the potential complications encompass prematurity,

low birth weight, abortion, stillbirth, and being small for gestational age (SGA), along with an elevated risk of the offspring inheriting CHD¹. The landscape of congenital heart disease has been significantly transformed due to remarkable advancements in childhood cardiac surgery². Consequently, a growing population of adults with congenital heart disease (ACHD) has emerged³. ACHD women, upon reaching childbearing age, necessitate comprehensive pre-pregnancy counseling to navigate the complexities of

pregnancy and minimize risks associated with their unique cardiac anatomies and histories^{2,3}. The spectrum of anatomic abnormalities and continuously evolving surgical and percutaneous procedures in the field of CHD presents a formidable challenge in risk stratification for pregnant women^{4,5}. Pregnancy induces substantial hemodynamic changes, which can be particularly challenging for women with congenital heart defects even in rare instances, maternal mortality may also be a concern⁶. Although instances of maternal mortality remain exceedingly rare, the numerical significance lies in the potential maternal and fetal/neonatal complications⁷. Various predictive factors have been identified to gauge the likelihood of complications in CHD pregnancies, and risk scores can be constructed using the World Health Organization (WHO) classification system^{8,9}. In light of these complexities and the pressing need for specialized care, this current study aimed to comprehensively assess the outcomes of pregnancies in women with congenital heart disease¹.

Methods:

This cross-sectional observational study was carried out at Combined Military Hospital (CMH), Dhaka, Bangladesh, spanning from January 2020 to December 2021. A total of 30 pregnant women diagnosed with congenital heart disease were included as subjects in this research. To select the sample, a purposive sampling technique was employed, with prior approval from the hospital's ethical committee. Written consent was diligently obtained from all participants before data collection, in strict adherence to the ethical principles outlined in the Helsinki Declaration¹⁰ and following applicable regulations, including the provisions of the General Data Protection Regulation (GDPR)¹¹. Baseline information encompassing maternal age, cardiac diagnosis, history of surgical or percutaneous interventions, co-morbidities, body mass index (BMI), medication usage, and awareness of congenital heart disease (CHD) was meticulously recorded. The assessment of maternal cardiovascular risk was conducted by classifying patients based on a modified World Health Organization (WHO) score⁸. Furthermore, data concerning pregnancy, obstetric history, age at conception, spontaneous abortions, 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 also comprehensively documented. Subsequently, the collected data underwent processing, analysis, and dissemination through the utilization of MS Office tools.

Result:

In this study of 30 participants, the mean age was 21.5 years, with the majority falling between 19 and 24 years old. A significant 90% had a prior surgical repair, highlighting their medical history. Hemoglobin levels ranged from 9.5 to 12.4 gm/dL, averaging 10.8 gm/dL, while oxygen saturation levels were consistently high at 96.60%. In terms of functional class by NYHA classification, 83.33% were in class II (indicating mild symptoms), and 16.67% were in class III (indicating moderate symptoms). (Table-I)

Table-I: Study participants baseline characteristics (n=30)

Clinical status	no. (%)
Age (Years)	19 to 24 (mean 21.5)
Previous surgical repair	27(90)
No previous surgical repair	3(10)
Haemoglobin (gm/dL)	9.5-12.4 (mean 10.8)
Oxygen saturation	96.60
Functional class (NYHA) (%)	II–25(83.33)
	III–5(16.67)

NYHA =New York Heart Association

Atrial septal defect (ASD) was found in 7 participants (23.35%), all of whom underwent repair. Ventricular septal defect (VSD) was present in 5 participants (16.68%), with 2 receiving surgical intervention, while 3 did not. Patent ductus arteriosus (PDA) occurred in 8 participants (26.69%), commonly managed through ligation and trans fixation. Tetralogy of Fallot (TOF) affected 6 participants (19.98%), all of whom had undergone repair. Pulmonary stenosis (PS) was detected in 3 participants (9.99%), all of whom had received repair. Lastly, congenital aortic stenosis was seen in 1 participant (3.33%), who had also undergone repair. (Table-II)

Table-II: Statistical analysis of participants with different cardiac defects (n=30)

Specific cardiac defects	no.(%)	Surgical repair technique
Atrial septal defect (ASD)	7(23.35)	All repaired
Ventricular septal defect (VSD)	5(16.68)	2 repaired 3 not repaired
Patent ductus arteriosus (PDA)	8(26.69)	Ligation and trans fixation
Tetralogy of Fallot (TOF)	6(19.98)	All repaired
Pulmonary stenosis (PS)	3(9.99)	All repaired
Congenital Aortic stenosis	1(3.33)	Repaired

In this study involving 30 pregnant women with congenital heart disease, the maternal outcomes in terms of the mode of delivery were examined (Table-III). The majority of deliveries were conducted through the Lower Segment Cesarean Section (LSCS), accounting for 43.3% of cases. Vaginal deliveries occurred in 36.7% of cases, with 11 instances attributed to spontaneous labor. Instrumental delivery, specifically through outlet forceps, was observed in 6.7% of cases. Termination of pregnancy was noted in 10% of cases, with 6.7% for inevitable abortion and 3.3% for medical termination. Unfortunately, there was one case of maternal death, constituting 3.3% of the overall outcomes.

Table-III: Maternal outcome of pregnancy in terms of mode of delivery (n=30)

Characteristics	Description	no.(%)
LSCS		13(43.3)
Vaginal delivery	Spontaneous labor	11(36.7)
Instrumental delivery	Outlet forceps	2(6.7)
Termination of pregnancy	Inevitable abortion	2(6.7)
	Medical termination	1(3.3)
Maternal death		1(3.3)

LSCS: Lower uterine segment section

In the evaluation of pregnancy outcomes involving a total of 30 cases, 90% resulted in live births, with 27 newborns. Apgar scores below 9/10 were noted in 18.5% of cases (5 instances), while 81.5% (22 cases) had Apgar scores equal to or greater than 9/10. Neonatal Intensive Care Unit (NICU)

admission was required for 33.3% of newborns (9 cases). Additionally, there was one instance (3.3%) of perinatal death. (Table-IV)

Table-IV: Pregnancy outcome distribution (n=30)

Characteristics		Total	no.(%)
Birth	Live	27	27(90)
	Dead	0	0(0)
Apgar score	<9/10	5	5(18.5)
	≥9/10	22	22(81.5)
NICU admission		9	9(33.3)
Medical termination		1	1(3.3)
Inevitable abortion		2	2(6.7)
Perinatal death		1	1(3.3)

Discussion:

This study aimed to assess the outcomes of pregnancies in women with congenital heart disease. In this study involving 30 participants, the average age was 21.5 years, predominantly falling between 19 and 24 years old. Notably, 90% had undergone previous surgical interventions, indicating their medical background. Hemoglobin levels ranged from 9.5 to 12.4 gm/dL, with an average of 10.8 gm/dL, while oxygen saturation consistently remained high at 96.60%. In a similar study,¹² the participant's mean age was 27.7±6.1 years and their mean oxygen saturation (%) was found 98.6±0.9%. In this study, the majority of deliveries (43.3%) were conducted through Lower Segment Cesarean Section (LSCS). Vaginal deliveries occurred in 36.7% of cases, with 11 instances attributed to spontaneous labor. Instrumental delivery, specifically through outlet forceps, was observed in 6.7% of cases. But in the studies conducted by Mazhar et al.¹³ and Hameed et al.¹⁴, the rate of spontaneous vaginal delivery was 76.2% and 73.5% respectively which were higher than that of us. Mazhar et al.¹³ found the rate of cesarean section around 21% which was comparable with our findings. In our study, termination of pregnancy was noted in 10% of cases, with 6.7% for inevitable abortion and 3.3% for medical termination. Unfortunately, there was one case of maternal death, constituting 3.3% of the overall outcomes. In a previous study,¹² spontaneous abortions were observed in 11 pregnancies at an average gestational age of 10.8±3.7 weeks and 7 pregnancies underwent elective termination. In this study, 90% resulted in live births (27 newborns). Apgar scores below 9/10

were observed in 18.5% of cases, with 81.5% having scores equal to or greater than 9/10. NICU admission was needed for 33.3% of newborns (9 cases). Additionally, there was one instance (3.3%) of perinatal death. In a similar study,¹⁵ the neonatal death rate was found 2.6%. An atrial septal defect is typically well-tolerated in pregnant women and often doesn't necessitate treatment. Nevertheless, in some cases, secondary pulmonary hypertension can develop, leading to reverse flow in the shunt, cyanosis, and increased morbidity and mortality if pregnancy occurs. Recent data regarding long-term outcomes following surgical closure of straightforward lesions like atrial septal defects have indicated favorable to excellent long-term survival¹⁶. The findings from this current study can serve as valuable insights for future research in similar areas.

Limitation:

This study was conducted at a single center with a limited sample size and within a brief timeframe. Consequently, the study's findings may not accurately represent the broader national or regional context.

Conclusion:

In pregnant women with congenital heart diseases, the predominant delivery methods are Lower Segment Cesarean Section (LSCS) and vaginal delivery, reflecting careful consideration of maternal health and heart condition. Encouragingly, the study reveals low rates of both pregnancy termination and maternal fatality, indicating effective medical management and prenatal care for this specific population. Perinatal outcomes present a positive picture, with the majority of births yielding live infants, demonstrating successful pregnancy management. The prevalence of Apgar scores ≥ 9 among newborns underscores the quality of care during labor and delivery. Nevertheless, some infants necessitate Neonatal Intensive Care Unit (NICU) admission, highlighting the importance of vigilant monitoring for potential complications. Overall, these findings provide reassurance regarding pregnancy outcomes in women with congenital heart diseases.

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