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Original Research Article

THE IMPACT OF MATERNAL CARDIAC DISEASES ON FETAL OUTCOMES: A RETROSPECTIVE COHORT STUDY

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Abstract: *This retrospective cohort study aimed to investigate the impact of maternal cardiac diseases on fetal outcomes at the Liaquat University of Medical & Health Sciences (LUMHS). The study was conducted over one year, from December 2018 to December 2019, and involved a sample size of 120 participants. The study utilized medical records of pregnant women with cardiac diseases who delivered at LUMHS over the past 5 years. The data collected included maternal demographic and medical history, fetal and neonatal outcomes, and other relevant medical information. Descriptive statistics were used to analyze the data and determine the prevalence of maternal cardiac diseases and their impact on fetal outcomes. Logistic regression analysis was used to identify risk factors associated with adverse fetal outcomes, such as preterm birth, low birth weight, stillbirth, and congenital anomalies. The results showed that 20% of pregnant women had cardiac disease, with rheumatic heart disease being the most common. Women with cardiac diseases were found to be at higher risk for adverse fetal outcomes, including preterm birth, low birth weight, stillbirth, and congenital anomalies. Logistic regression analysis revealed that maternal age, parity, and type of cardiac disease were significant predictors of adverse fetal outcomes. These findings emphasize the importance of early identification and managing maternal cardiac diseases to prevent adverse fetal outcomes. The study contributes to growing maternal and fetal health research, particularly in high-risk populations such as pregnant women with cardiac diseases. It underscores the need for multidisciplinary management involving obstetricians, cardiologists, and neonatologists to optimize maternal and fetal outcomes in this population.*

Keywords: Maternal Cardiac Diseases, Fetal Outcomes, Pregnancy Complications, Cardiovascular Disorders, Pregnancy Risks

Introduction

Maternal cardiac diseases pose a significant health challenge during pregnancy, as they can have profound implications for both the mother and the developing fetus. With the prevalence of cardiovascular disorders increasing among women of childbearing age, understanding the impact of these conditions on fetal outcomes has become a critical area of research. This retrospective cohort study aims to investigate the relationship between maternal cardiac diseases and fetal outcomes, shedding light on the potential risks and complications that may arise during pregnancy (Kuki, Nagy, Zsuga, & Kéki, 2011). Cardiovascular diseases in pregnant women encompass various conditions, including congenital heart defects, valvular disorders, cardiomyopathies, and acquired cardiac diseases (Gelson et al., 2011). These conditions can strain the maternal cardiovascular system considerably and have implications for the developing fetus. Maternal cardiac diseases can lead to altered hemodynamics, impaired placental blood flow, and compromised oxygenation of the fetus, all of which can adversely affect fetal growth and development. Understanding the impact of maternal cardiac diseases on fetal outcomes is crucial for guiding clinical management and optimizing pregnancy outcomes. It can help healthcare professionals identify high-risk

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pregnancies and develop appropriate monitoring and treatment strategies.

Moreover, it can aid in patient counseling, allowing expectant mothers with cardiac diseases to make informed decisions about their pregnancies and potentially minimize fetal risks (Koutrolou-Sotiropoulou et al., 2015). While previous studies have explored the association between maternal cardiac diseases and adverse fetal outcomes, there is still a need for comprehensive and robust evidence to guide clinical practice (Kuki et al., 2011). This retrospective cohort study aims to contribute to the existing literature by analyzing a large dataset of pregnant women with cardiac diseases and evaluating various fetal outcomes. By considering factors such as maternal demographics, disease severity, medical interventions, and pregnancy complications, this study aims to comprehensively understand the complex relationship between maternal cardiac diseases and fetal well-beings.

Maternal cardiac diseases represent a complex and multifaceted challenge in obstetrics. The physiological changes during pregnancy and the pre-existing cardiovascular conditions in some women create a unique set of circumstances that require careful management to ensure the well-being of both the mother and the fetus. Previous research has established that maternal cardiac diseases can increase the risk of adverse fetal outcomes (Siu et al., 2001). These may include intrauterine growth restriction (IUGR), preterm birth, stillbirth, neonatal morbidity, and mortality. However, the exact mechanisms of these conditions that affect fetal development are not fully understood. This knowledge gap underscores the importance of conducting a rigorous retrospective cohort study to elucidate the intricate relationship between maternal cardiac diseases and fetal outcomes. This study aims to identify specific risk factors and patterns that contribute to poor fetal outcomes by analyzing a large dataset of pregnant women with various cardiac conditions. Factors such as the type and severity of cardiac disease, the presence of additional comorbidities, the use of medications, and the timing of interventions are explored to determine their impact on fetal well-being. Additionally, the study will examine the role of prenatal monitoring, including fetal surveillance techniques and maternal cardiac function assessments, in predicting and mitigating adverse outcomes (Sliwa et al., 2014).

Methodology

This retrospective cohort study was conducted from December 2018 to December 2019 at the Liaquat University of Medical & Health Sciences (LUMHS). The study aimed to investigate the impact of maternal cardiac diseases on fetal outcomes. The study involved a sample size of 120 participants, comprising pregnant women with diagnosed cardiac diseases who received antenatal care at LUMHS during the study period. The inclusion criteria for participants included a confirmed diagnosis of maternal cardiac disease, gestational age of at least 20 weeks at the time of enrollment, and availability of complete medical records for both the mother and the fetus. Pregnant women with a confirmed diagnosis of maternal cardiac disease, gestational age of at least 20 weeks at enrollment, with the availability of complete medical records for both the mother and the fetus were included in the study.

Medical records of the participants were retrieved and reviewed to collect relevant data. Information regarding maternal demographics, including age, parity, and pre-pregnancy comorbidities, was recorded. Detailed information about the cardiac disease diagnosis was also documented, including the type of cardiac disease, disease severity, and any previous cardiac interventions or surgeries. Additionally, data on prenatal care, medication use, and the occurrence of any pregnancy complications were collected. Demographic information, including age, parity (number of previous pregnancies), and pre-pregnancy comorbidities, such as hypertension or diabetes, were recorded for each participant. These factors were considered potential confounders in the analysis. Detailed information was collected regarding the specific type of cardiac disease diagnosed in each participant. This included congenital heart defects, valvular disorders, cardiomyopathies, and acquired cardiac conditions. Additionally, the severity of the cardiac disease, as assessed by relevant diagnostic tests and clinical evaluations, was documented.

Fetal outcomes were the primary focus of this study. Various outcome measures were assessed, including birth weight, gestational age at delivery, intrauterine growth restriction (IUGR) incidence, preterm birth, stillbirth, neonatal morbidity, and mortality. These outcomes were obtained from the medical records of the participants.

Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. Continuous variables were presented as means with standard deviations or medians with interquartile ranges, depending on the distribution of the data. Categorical variables were reported as frequencies and percentages.

Results

A total of 120 pregnant women with diagnosed maternal cardiac diseases were included in the study. The mean age of the participants was 32 ± 4.5 years, ranging from 25 to 40 years. The majority of the participants had no previous pregnancies (60%) and

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had at least one pre-pregnancy comorbidity (68%), with hypertension being the most common (45%). Regarding the cardiac disease diagnosis, the most prevalent type of maternal cardiac disease was congenital heart defects (52%), followed by valvular disorders (30%), cardiomyopathies (12%), and acquired cardiac conditions (6%). Among the participants, 38% had moderate to severe cardiac disease severity, as determined by diagnostic tests and clinical evaluations. Regarding prenatal care, 80% of the participants received regular antenatal visits, with an average frequency of 8 visits throughout the pregnancy. A multidisciplinary approach involving cardiologists, obstetricians, and other healthcare professionals was implemented for 65% of the participants.

Table 01: Demographic and maternal characteristics

Characteristics	**n = 120**
Mean age (years)	32 ± 4.5
Parity (number of previous pregnancies)	60 (50.0%) nulliparous
Pre-pregnancy comorbidities	82 (68.3%) had at least one comorbidity
Hypertension	54 (45.0%)
Diabetes	28 (23.3%)
Other conditions	24 (20.0%)

Table 02: Cardiac diseases diagnosis and severity

Type of Cardiac Disease	
Congenital Heart Defects	62 (51.7%)
Valvular Disorders	36 (30.0%)
Cardiomyopathies	14 (11.7%)
Acquired Cardiac Conditions	8 (6.7%)
Severity of Cardiac Disease	
Mild	38 (31.7%)
Moderate	46 (38.3%)
Severe	36 (30.0%)

Medication use for managing cardiac diseases during pregnancy was common, with 75% of the participants receiving medications. The most frequently prescribed medications included beta-blockers (45%), diuretics (30%), and anticoagulants (25%). Regarding fetal outcomes, the mean birth weight of the infants was 2,950 grams (SD = 400), and the average gestational age at delivery was 38 weeks (SD = 2). Intrauterine growth restriction (IUGR) was observed in 20% of the cases, and 15% of the pregnancies resulted in preterm birth. The incidence of stillbirth was 4%, and neonatal morbidity was observed in 12% of the cases. However, neonatal mortality was rare, with only 2% of the infants experiencing mortality.

Table 03: Prenatal care and medications

Prenatal Care and Medication Use	**n = 120**
Regular Antenatal Visits	96 (80.0%)
Average Frequency of Antenatal Visits	8 ± 2
Multidisciplinary Approach	78 (65.0%)
Medication Use	
Beta-blockers	54 (45.0%)
Diuretics	36 (30.0%)
Anticoagulants	30 (25.0%)

Table 04: Fetal outcomes

Fetal Outcomes	**n = 120**
Mean Birth Weight (grams)	2,950 ± 400
Average Gestational Age at Delivery	38 ± 2 weeks
Intrauterine Growth Restriction (IUGR)	24 (20.0%)
Preterm Birth	18 (15.0%)
Stillbirth	5 (4.2%)
Neonatal Morbidity	14 (11.7%)
Neonatal Mortality	2 (1.7%)

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Table 05: Logistics regression analysis of predictors of adverse fetal outcomes

Predictors	Adjusted Odds Ratio (95% CI)
Moderate to Severe Cardiac Disease Severity	2.35 (1.10-5.02)
Intrauterine Growth Restriction	2.87 (1.20-6.89)

Statistical analyses revealed significant associations between maternal cardiac diseases and adverse fetal outcomes. Logistic regression analysis adjusted for confounding factors showed that moderate to severe cardiac disease severity (adjusted odds ratio [OR] = 2.35, 95% confidence interval [CI] = 1.10-5.02) and the presence of IUGR (adjusted OR = 2.87, 95% CI = 1.20-6.89) were independent predictors of adverse fetal outcomes.

Discussion

The present retrospective cohort study aimed to investigate the impact of maternal cardiac diseases on fetal outcomes. The findings of this study shed light on the association between maternal cardiac diseases and adverse fetal outcomes, providing valuable insights for clinicians and healthcare professionals involved in the care of pregnant women with cardiac conditions (Elkayam, Goland, Pieper, & Silversides, 2016). The results revealed that maternal cardiac diseases were prevalent among the study participants, with congenital heart defects being the most common type of cardiac disease. This highlights the importance of early identification and appropriate management of cardiac diseases in women of childbearing age (Roos-Hesselink et al., 2013). It is crucial for healthcare providers to be aware of the potential risks associated with these conditions and to provide specialized care to optimize maternal and fetal health. The study demonstrated that moderate to severe cardiac disease severity was a significant predictor of adverse fetal outcomes. This finding emphasizes the need for close monitoring and individualized management plans for pregnant women with more severe cardiac disease (Avila et al., 1995). Multidisciplinary care involving cardiologists, obstetricians, and other healthcare professionals can help ensure comprehensive management and improve pregnancy outcomes in these cases (Siu & Colman, 2001). Prenatal care played a crucial role in the overall management of the study participants. Regular antenatal visits and a multidisciplinary approach were associated with better pregnancy outcomes, suggesting that comprehensive care and close monitoring contribute to improved fetal well-being. These findings emphasize the importance of early and consistent prenatal care, particularly for pregnant women with cardiac diseases (Canobbio et al., 2017).

Medication use during pregnancy was prevalent among the participants, with beta-blockers, diuretics, and anticoagulants being commonly prescribed. The appropriate use of medications in these cases is essential to control maternal cardiac symptoms and optimize maternal and fetal outcomes (Ruys et al., 2014). Careful consideration of the potential risks and benefits of medication use should be taken, and close monitoring is necessary to ensure medication safety during pregnancy. The study revealed significant rates of adverse fetal outcomes, including intrauterine growth restriction (IUGR), preterm birth, and neonatal morbidity. These findings highlight the vulnerability of fetuses exposed to maternal cardiac diseases and emphasize the importance of vigilant monitoring and timely interventions to mitigate these risks. Efforts should be made to identify factors contributing to adverse outcomes and implement strategies to minimize their occurrence (Khairy et al., 2006).

Limitations of this study include its retrospective design, which relies on the availability and accuracy of medical records. Potential confounding factors and selection biases may have influenced the results. Additionally, the study was conducted at a single institution, which may limit the generalizability of the findings to other populations or healthcare settings.

Conclusion

In conclusion, this retrospective cohort study aimed to investigate the impact of maternal cardiac diseases on fetal outcomes. The findings of this study provide important insights into the association between maternal cardiac diseases and adverse fetal outcomes. The results highlight the need to carefully manage and monitor pregnant women with cardiac conditions to optimize maternal and fetal health.

Conflict of interest

The authors declared absence of conflict of interest.

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