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# FREQUENCY OF CONGENITAL HEART DISEASES IN INFANTS OF DIABETIC MOTHERS ATTENDING IN A TERTIARY CARE HOSPITAL

**Dr. Farman Ullah[*1] Prof Dr. Sijad Ur Rahman[2], Dr. Muhammad Kashif Khan[3], Dr. Ahmad Raza Nasir[4], Dr. Muhammad Haris[5]**

[*1,3,4,5] *PGR Peadiatrics BMC Swabi*
[2] *Prof of Peadiatrics BMC Swabi*

[*1]farmanvardagg@gmail.com, [2]prof.sijad@gmail.com, [3]kk9117@gmail.com, [4]dawarahmadraza@gmail.com, [5]harisjan94@gmail.com

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**Corresponding Author: ***
**Dr. Farman Ullah**

## Abstract

***Background:*** *Congenital heart diseases (CHDs) are among the most common congenital anomalies and represent a major cause of infant morbidity and mortality. Maternal diabetes, including pre-existing and gestational diabetes mellitus, has been consistently associated with an increased risk of fetal cardiac malformations. However, local data regarding the frequency of CHDs among infants born to diabetic mothers remain limited, highlighting the need for regional epidemiological evidence to support early diagnosis and preventive strategies.*

***Objective:*** *To determine the frequency of congenital heart diseases among infants born to diabetic mothers attending a tertiary care hospital and to evaluate the demographic and clinical factors associated with these cardiac anomalies.*

***Methods:*** *A descriptive cross-sectional study will be conducted over six months at the Department of Pediatrics, Bacha Khan Medical Complex/Gajju Khan Medical College, Swabi, Pakistan. A total of 360 infants aged 0–12 months born to mothers with either gestational or pre-existing diabetes mellitus will be recruited using convenience sampling. Data will be collected through a structured questionnaire, medical record review, clinical examination, and echocardiography to confirm CHDs. Demographic and clinical characteristics, including maternal age, diabetes type, and glycemic control, will be recorded. Statistical analysis will be performed using SPSS version 27. Descriptive statistics will summarize the prevalence of CHDs, while Chi-square or Fisher's exact tests will assess associations between categorical variables, with statistical significance set at $p < 0.05$.*

***Expected Outcomes:*** *The study is expected to establish the prevalence of congenital heart diseases among infants of diabetic mothers and identify associated maternal and neonatal factors. The findings will provide baseline regional data to support targeted screening, optimize prenatal counseling, and improve the clinical management of diabetic pregnancies.*

## INTRODUCTION

Congenital heart diseases (CHDs) are among the most common congenital anomalies affecting infants worldwide, posing significant health risks and long-term developmental challenges. Previous research has established a link between maternal

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diabetes and an increased risk of congenital anomalies, including CHDs. Understanding this association is crucial, as it can guide prenatal care strategies and inform clinical practices aimed at improving maternal and infant health outcomes.
A study showed that there was a strong association between maternal diabetes and cardiovascular congenital abnormalities with an odds ratio of 3.4 at 95% confidence interval. In another study, The summary OR estimate for the association between maternal diabetes and congenital heart diseases was 3.8 (95% CI). Infant weight abnormalities,

hypoglycemia and abnormal echocardiogram reports are significantly increased in neonates of diabetic mothers. Another study showed that the frequency of Congenital Heart Diseases in infants of diabetic mothers was 52.5% indication a positive association between congenital heart diseases and maternal diabetes. According to a study, the prevalence of congenital heart diseases in neonates born to diabetic mothers was significantly higher than non-diabetic mothers. a study by et al. revealed that he relative Risk (RR) of cyanotic congenital heart diseases were 4.61 (95% CI) for pre-pregnancy diabetes and 1.5 for gestational diabetes.
Establishing a baseline frequency of CHDs in this population will help lay the foundation for future studies on a larger and broader scale, and may be helpful in informing clinical guidelines regarding management and awareness of diabetic pregnancies.

**Objectives:**

- To quantify the prevalence of congenital heart diseases in infants of mothers with diabetes (both gestational and pre-existing).
- To explore the demographic and clinical factors associated with these conditions.

**Operational Definitions:**

1. **Congenital Heart Diseases (CHDs):** Congenital heart diseases refer to structural abnormalities of the heart and great vessels that are present at birth. For this study, CHDs will be defined as any defect detected through clinical examination, echocardiography, or other diagnostic imaging techniques, including but not limited to:
   - Atrial Septal Defect (ASD)
   - Ventricular Septal Defect (VSD)
   - Tetralogy of Fallot (ToF)
   - Coarctation of the Aorta
   - Transposition of the Great Arteries
2. **Infants:** Infants in this study will be defined as children aged 0 to 12 months at the time of diagnosis. This age range is chosen to capture early onset congenital conditions and ensure uniformity in the population being studied.
3. **Diabetic Mothers:** Diabetic mothers will be defined as women who have been diagnosed with diabetes mellitus (either Type 1 or Type 2) prior to or during pregnancy. The criteria for diabetes diagnosis will include:
   - A fasting blood glucose level of ≥ 126 mg/dL
   - A random plasma glucose level of ≥ 200 mg/dL with symptoms of hyperglycemia
   - A 2-hour plasma glucose level of ≥ 200 mg/dL during an Oral Glucose Tolerance Test (OGTT)

**METHODOLOGY:**

**Study Design:** Descriptive Cross Sectional Study
**Study setting:** Bacha Khan Medical Complex, Gajju Khan Medical College, Sawabi, Khyber Pakhtunkhwa, Pakistan.

**Study Duration:** This study will be completed in 6 months after obtaining ethical approval from the institutional review board.

**Study Population:** Babies born to Diabetic Mothers (both gestational and pre-existing) presenting to Bacha Khan Medical Complex, Gajju Khan Medical College Sawabi.

**Sample Size Calculation:** The sample size was calculated using OpenEpi (Version 3.01, Proportion: Frequency in a Population). We used an anticipated frequency of congenital heart disease (CHD) among infants of diabetic mothers (IDMs) of 36.7%[7]. With a confidence level (2-sided): 95%, Anticipated frequency (p):36.7%,

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Design effect: 1.0, the total calculated sample size is 360.

**Sampling Technique:** Non-Randomized Convenience Sampling

**Inclusion Criteria:** The following individuals will be included:

1. Infants born to mothers who are diabetic. (both Gestational and pre-existing) presenting to the pediatrics department of Bacha Khan Medical Complex.

**Exclusion Criteria:** The following individuals will be excluded:

1. Infants whose parents/guardians do not consent to participate in the study.

**Data Collection Procedure:** Ethical Approval will be sought from the institutional ethical review board, informed consent will be signed from the parents/guardians of the eligible infants after explaining to them the complete details of the study.

data will be collected from eligible candidates using a preformed questionnaire which will contain demographic information (age, gender, maternal age, type of diabetes, and glycemic control) of the participant. Data will be collected through medical records and clinical assessments, including echocardiograms to confirm diagnoses of CHDs.

**Data Analysis:** Data will be entered into SPSS version 27 for further analysis, descriptive statistics will be used to analyze the frequency of Congenital Heart Diseases (CHDs). Qualitative Data will be presented using frequencies and percentages while quantitative data will be represented using mean and standard deviations. To assess the relationships between maternal and infant characteristics, Chi-square tests or Fischer's Exact test will be used, if eligible, to explore the associations between the categorical variables.

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