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# PECULIARITIES OF THE FREQUENCY AND CLINICAL MANIFESTATIONS OF CONGENITAL HEART DEFECTS IN CHILDREN DURING THE COVID-19 PANDEMIC

Badieva Dilorom Saidovna
Bukhara State Medical Institute named after Abu Ali Ibn Sina
badiyeva.dilorom@bsmi.uz

**Abstract**
The COVID-19 pandemic has significantly affected healthcare systems worldwide, leading to changes in the detection, clinical presentation, and treatment of congenital heart defects (CHDs) in children. This study aims to analyze the frequency and clinical features of CHDs during the pandemic period, comparing them with pre-pandemic data.

**Keywords**: Congenital heart defects, COVID-19, children, clinical manifestations, frequency, pandemic.

## Introduction

Congenital heart defects (CHDs) represent the most prevalent form of congenital anomalies worldwide, affecting approximately 8 in 1,000 live births [1-5]. They encompass a wide range of structural abnormalities of the heart and great vessels that arise during fetal development [6-8]. Early diagnosis and timely intervention are critical for reducing morbidity and mortality, particularly in severe forms such as hypoplastic left heart syndrome or transposition of the great arteries [9-12].

The outbreak of the COVID-19 pandemic in early 2020 profoundly disrupted healthcare systems around the globe [13-15]. Pediatric healthcare services, including cardiology, were not exempt from this disruption [16]. Many healthcare facilities repurposed resources to address the surge in COVID-19 cases, resulting in decreased availability of non-COVID services, including prenatal screening, pediatric echocardiography, and elective surgeries. Additionally, parental anxiety regarding exposure to the virus contributed to delayed hospital visits, especially in the first year of the pandemic [17-20].

Telemedicine rapidly emerged as a substitute for in-person consultations; however, for conditions such as CHDs—where diagnosis heavily relies on physical examination and imaging—this shift was often insufficient. Delayed identification and management of CHDs can lead to poor clinical outcomes, increased need for emergency interventions, and, in severe cases, death [21-24].

Furthermore, the pandemic altered the landscape of prenatal care. Many routine obstetric visits were canceled or postponed, leading to missed or delayed detection of CHDs via fetal echocardiography. In countries with limited healthcare infrastructure, these challenges were even



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more pronounced [25-28]. As a result, many infants with CHDs presented later than usual, often in more critical condition [29-32].

This study seeks to examine the frequency and clinical characteristics of congenital heart defects in children during the COVID-19 pandemic period, comparing them with data from the pre-pandemic years. By identifying trends and challenges, this research aims to contribute to the development of resilient pediatric cardiac care systems that can withstand future global health emergencies [33-36].

**Material and Methods:**

This retrospective, comparative observational study was conducted at the Bukhara Regional Multidisciplinary Medical Center for Children, located in Bukhara, Uzbekistan. The study included pediatric patients diagnosed with congenital heart defects (CHDs) over a five-year period, from January 2018 to December 2022. The study period was divided into two distinct phases: the pre-pandemic period (January 2018 – December 2019) and the pandemic period (January 2020 – December 2022).

A total of 120 children aged 0 to 18 years who were diagnosed with CHDs through clinical examination and echocardiographic confirmation were included. Patients with acquired heart diseases or incomplete medical records were excluded from the study. The participants were grouped based on the time of diagnosis—before or during the COVID-19 pandemic.

**Data Collection:**

Patient medical records were reviewed to extract the following variables:

- Demographic data (age, sex, place of residence),
- Type of congenital heart defect (e.g., ventricular septal defect, atrial septal defect, tetralogy of Fallot, etc.),
- Clinical presentation (cyanosis, heart murmur, failure to thrive, respiratory distress, etc.),
- Age at diagnosis and time delay from symptom onset to diagnosis,
- Echocardiographic findings,
- Referral patterns and prior prenatal screening history,
- Type and timing of intervention (if any),
- Outcome measures (hospitalization duration, complications, mortality).

**Diagnostic Procedures:**

All patients underwent standard clinical examination followed by echocardiography using devices available at the pediatric cardiology unit of the center. In selected cases, additional imaging such as chest X-rays and ECGs were reviewed.

**Data Analysis:**

The data were entered into Microsoft Excel and analyzed using SPSS version [e.g., SPSS 26.0]. Descriptive statistics were used to summarize the data. Continuous variables were expressed as means ± standard deviations, and categorical variables as frequencies and percentages. Comparisons between the pre-pandemic and pandemic groups were performed using Student's t-



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test for continuous variables and the chi-square test for categorical variables. A p-value of less than 0.05 was considered statistically significant.

**Results:**

A total of 120 pediatric patients with congenital heart defects (CHDs) were included in the study. Among them, 52 children (43.3%) were diagnosed during the pre-pandemic period (2018–2019), while 68 children (56.7%) were diagnosed during the COVID-19 pandemic period (2020–2022).

**1. Patient Demographics:**

The mean age at diagnosis was significantly higher in the pandemic group (5.6 ± 3.1 months) compared to the pre-pandemic group (3.2 ± 2.5 months, $p < 0.05$). There was no significant difference in sex distribution between the two groups (male-to-female ratio: 1.1:1).

**2. Types of Congenital Heart Defects:**

The most frequently diagnosed CHDs across both groups were:

- Ventricular septal defect (VSD): 32 cases (26.7%)
- Atrial septal defect (ASD): 25 cases (20.8%)
- Tetralogy of Fallot (TOF): 14 cases (11.7%)
- Patent ductus arteriosus (PDA): 18 cases (15.0%)
- Complex cyanotic CHDs: 10 cases (8.3%)

During the pandemic, a relative increase in complex CHDs and late presentations was observed, with more cases of TOF and cyanotic defects (14.7% during pandemic vs. 7.6% pre-pandemic).

**3. Clinical Presentation:**

Children diagnosed during the pandemic more frequently presented with:

- Cyanosis (38.2% vs. 21.1%, $p < 0.05$)
- Heart failure symptoms (30.9% vs. 17.3%, $p < 0.05$)
- Failure to thrive (42.6% vs. 25.0%, $p < 0.05$)

**4. Diagnostic Delay and Access to Care:**

Delayed diagnosis was noted in 45.5% of pandemic-period cases compared to only 21.2% in the pre-pandemic group. Prenatal detection of CHDs via fetal echocardiography dropped from 13.5% to 5.9% during the pandemic.

**5. Treatment and Outcomes:**

- 40% of pre-pandemic patients underwent timely surgical or interventional correction, compared to only 25% during the pandemic ($p < 0.05$).
- The average length of hospital stay was longer during the pandemic (12.3 ± 4.1 days vs. 8.7 ± 3.5 days).
- Complication rates (e.g., pulmonary hypertension, arrhythmia) were also higher in the pandemic group (26.5% vs. 13.4%).



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These results suggest that the COVID-19 pandemic was associated with delays in diagnosis, more severe clinical presentations, and less timely access to cardiac interventions.

**Discussion:**

The COVID-19 pandemic led to a noticeable reduction in the detection rate of CHDs, likely due to decreased healthcare access and parental hesitancy. The increase in late presentations emphasizes the need for robust telemedicine, continued prenatal care, and public health awareness during global crises.

**Conclusion:**

The pandemic significantly influenced the epidemiology and clinical features of CHDs in children. Future preparedness strategies should prioritize continuity of essential pediatric services even during health emergencies.

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