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Research Article

Characteristics of Congenital Heart Disease Patients in Rumah Sakit Jantung dan Pembuluh Darah Harapan Kita from 2019 to 2023

Karakteristik Pasien Penyakit Jantung Bawaan di Rumah Sakit Jantung Pembuluh Darah Harapan Kita Periode 2019–2023

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Abstract

Congenital heart disease (CHD) is one of the most common congenital disorders, affecting approximately 8 per 1,000 live births in Indonesia. This study aimed to describe the demographic and clinical characteristics of pediatric patients with CHD treated at Rumah Sakit Jantung dan Pembuluh Darah Harapan Kita from 2019 to 2023. A descriptive cross-sectional study was conducted using medical record data from 5,599 patients under the age of 18. Variables analyzed included annual case distribution, demographic characteristics, CHD classification, complications, and treatment outcomes. The highest number of cases was recorded in 2023 (1,457 cases; 26.02%). Most patients were under five years old (59.94%), with a slight female predominance (50.94%). Acyanotic CHD was more prevalent (60.33%), predominantly ventricular septal defect (53.11%), while cyanotic CHD accounted for 39.67%, dominated by Tetralogy of Fallot (59.70%). Congestive heart failure and pulmonary hypertension were the most frequent complications. Cyanotic CHD was associated with growth and developmental disorders and malnutrition, whereas acyanotic CHD generally demonstrated adequate nutritional status. The most common intervention was total repair of Tetralogy of Fallot. Surgical success rates were high in acyanotic (97.37%) and cyanotic CHD (94.73%). Mortality was higher in cyanotic CHD, particularly with delayed diagnosis. Early detection improves outcomes significantly overall.

***Keywords**: acyanotic; characteristic; congenital heart disease; cyanotic; pediatric*

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Abstrak

Penyakit jantung bawaan (PJB) merupakan kelainan kongenital yang memengaruhi sekitar 8 dari setiap 1.000 kelahiran hidup di Indonesia. Penelitian ini bertujuan untuk menggambarkan karakteristik demografis dan klinis pasien PJB pediatrik yang dirawat di Rumah Sakit Jantung dan Pembuluh Darah Harapan Kita tahun 2019 hingga 2023. Studi potong lintang deskriptif ini menganalisis data rekam medis dari 5.599 pasien anak dengan PJB berusia dibawah 18 tahun. Data yang dikaji meliputi insidensi tahunan, distribusi demografis, klasifikasi PJB, komplikasi, serta hasil pengobatan. Kasus tertinggi tercatat pada tahun 2023 (1.457 kasus; 26,02%), mayoritas pasien berusia di bawah lima tahun (59,94%) dan sedikit didominasi perempuan (50,94%). PJB asiatonik lebih sering ditemukan (60,33%) terutama defek septum ventrikel (53,11%), sementara PJB sianotik (39,67%) didominasi oleh Tetralogy of Fallot (59,70%). Komplikasi sering terjadi meliputi gagal jantung kongestif dan hipertensi pulmonal. PJB sianotik berhubungan dengan gangguan tumbuh kembang dan malnutrisi, sedangkan PJB asianotik umumnya menunjukkan status nutrisi dan pertumbuhan yang adekuat. Intervensi terbanyak adalah reparasi total Tetralogy of Fallot. Tingkat keberhasilan prosedur tinggi pada kedua jenis PJB (asianotik: 97,37%; sianotik: 94,73%). Mortalitas lebih tinggi ditemukan pada PJB sianotik, terutama pada kasus dengan diagnosis terlambat. Simpulan penelitian ini menekankan pentingnya deteksi dan penanganan dini untuk meningkatkan luaran klinis pasien PJB.

Kata kunci: asianotik; karakteristik; penyakit jantung bawaan; sianotik; pediatri

Introduction

Congenital Heart Disease (CHD) refers to structural abnormalities of the heart that develop during intrauterine growth, leading to abnormal blood circulation.[1] CHD is the most common congenital anatomical malformation, accounting for approximately 25% of all congenital anomalies.[2] Globally, the prevalence of CHD is estimated at 9.4 per 1,000 live births, while in Indonesia, it ranges between 0.8% and 1.2% of total births, with a mortality rate of 81 cases per 100,000 live births.[3–5]

One of the primary challenges in managing CHD in Indonesia is the lack of early detection. Many CHD cases remain undiagnosed in the early stages, leading to severe complications in patients who survive but do not receive appropriate treatment.[6] Studies have shown that undiagnosed CHD patients may suffer from long-term health issues, including

impaired growth and reduced quality of life.[7] Additionally, CHD is closely associated with the nutritional status of affected children. Due to increased energy expenditure and inadequate nutrient intake, children with CHD often experience malnutrition, which further complicates disease progression and clinical outcomes.[8]

Research on CHD at the Rumah Sakit Jantung dan Pembuluh Darah Harapan Kita (RSJPDHK) is crucial, as this hospital serves as the national referral center for cardiovascular diseases, including CHD, with a high number of cases from diverse regions across Indonesia. This provides an opportunity to analyze CHD patient characteristics on a large scale while capturing the clinical variations present nationwide. Moreover, RSJPDHK is equipped with advanced diagnostic and therapeutic facilities, including echocardiography, cardiac catheterization, and pediatric cardiac surgery, ensuring accurate data collection and evaluation of treatment outcomes. With a comprehensive medical database, research at RSJPDHK enables a thorough assessment of clinical characteristics and care patterns, supporting improvements in CHD management. This research aims to describe the demographic and clinical characteristics of pediatric patients with CHD at RSJPDHK during the period from 2019 to 2023, as a basis to support early detection efforts and optimization of clinical management of CHD in Indonesia.

Methods

This study employed a retrospective descriptive cross-sectional design using medical record data from pediatric patients diagnosed with cyanotic and acyanotic CHD at the RSJPDHK between 2019 and 2023. The data collection was conducted from January 2024 to November 2024 A total of 5,599 patients under 18 years of age were included in the study.

The period between 2019 and 2023 was deliberately selected to capture recent trends in CHD cases among children in Indonesia, while also accounting for the impact of the COVID-19 pandemic on pediatric cardiac care. The year 2019 represents the pre-pandemic baseline, enabling comparison with subsequent years during which healthcare systems experienced significant disruptions. By including data up to 2023, this study also aims to provide an updated overview of CHD case distribution and management in the post-pandemic context.

The study utilized a whole sampling technique, including all eligible CHD patients who met the inclusion criteria. Data was extracted from electronic medical records, capturing relevant clinical and demographic characteristics.

Univariate analysis was conducted to describe the distribution of CHD cases, including age, sex, type of CHD (cyanotic or acyanotic), comorbidities, complications, nutritional status, medical interventions, and treatment outcomes. Data were presented in frequency tables as

absolute numbers and percentages for each variable. Descriptive statistics were used to summarize the findings, and conclusions were drawn based on the observed trends in the dataset.

Nutritional status data analyzed in this study were restricted to patients treated in 2023. This decision was made to capture the most recent clinical conditions of pediatric CHD patients, particularly in the context of post-COVID-19 healthcare recovery, which may have influenced nutritional outcomes. Focusing on a single year also aimed to reduce temporal variability and potential confounding factors, thereby enabling a clearer comparison between cyanotic and acyanotic CHD groups.

This study received ethical approval from the Ethics Committee of the Faculty of Medicine, Maranatha Christian University (Approval Number: 082/KEP/VII/2024) and from the Ethics Committee of the RSJPDHK (Approval Number: DP.04.03/D.XIII/13008/2024). Since this study involved the use of patient medical records, strict confidentiality was maintained in accordance with fundamental ethical principles, including respect for people, beneficence, non-maleficence, and justice.

Results

Based on the medical records of pediatric congenital heart disease (CHD) patients at the RSJPDHK from 2019 to 2023, 5,599 pediatric CHD patients were recorded.

Table 1. Demographic Characteristics of Pediatric Patients with Congenital Heart Disease (N = 5,599)

Characteristic	n	%
Number of CHD patients per year		
2019	1118	19.97
2020	877	15.66
2021	1016	18.15
2022	1131	20.20
2023	1457	26.02
Age		
<5 years	3356	59.94
5–9 years	1180	21.08
10–18 years	1063	18.99
Types of CHD		
Cyanotic	2221	39.67
Acyanotic	3378	60.33
Gender		
Male	2747	49.06
Female	2852	50.94

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Based on Table 1, the highest number of pediatric CHD cases during the 2019–2023 period was recorded in 2023, with 1,457 cases (26.02%). The most affected age group was children under five, accounting for 3,356 patients (59.94%). The most common type of congenital heart disease was the acyanotic type, with 3,378 cases (60.33%). In terms of gender distribution, male patients accounted for 2,747 cases (49.06%), while female patients were slightly higher, with 2,852 cases (50.94%).

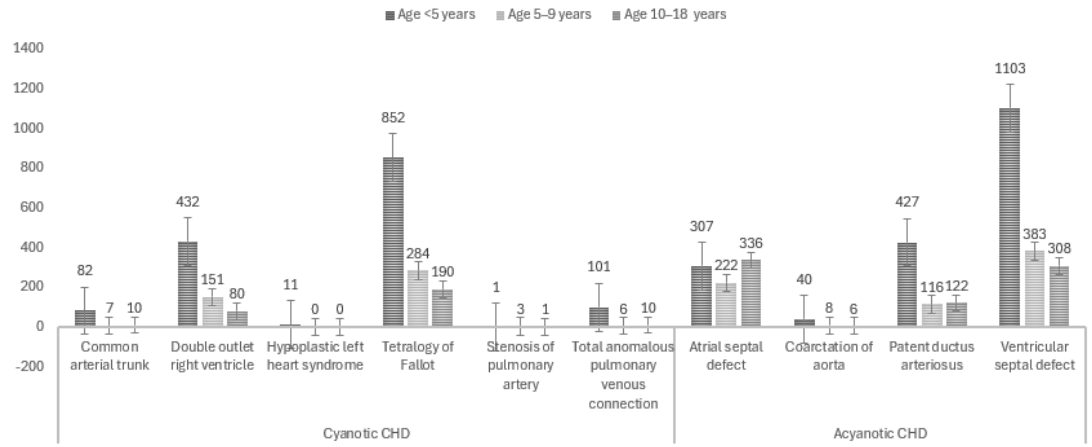

Figure 1 Age Distribution of Pediatric Patients with Cyanotic and Acyanotic Congenital Heart Disease

Figure 1 illustrated the age distribution of pediatric patients with cyanotic and acyanotic CHD. The highest prevalence was observed in children under five years old, with 1,479 cases (66.35%), and Tetralogy of Fallot was the most common condition, accounting for 852 cases (37.10%).

Similarly, among pediatric acyanotic CHD patients, children under five years old were the most affected group, with 1,877 cases (55.57%). The most frequently diagnosed condition was ventricular septal defect (VSD), with 1,103 cases (32.65%).

Based on the sex distribution, the majority of patients in the cyanotic CHD group were male, totaling 1,246 patients (56.10%), and Tetralogy of Fallot was the most common condition, with total 726 male (32.69%). Meanwhile, in the acyanotic CHD group, female patients were more prevalent, with a total of 1,894 cases (56.07%). However, the most common acyanotic CHD condition was ventricular septal defect (VSD), which was more frequently found in males, accounting for 945 cases (27.98%).

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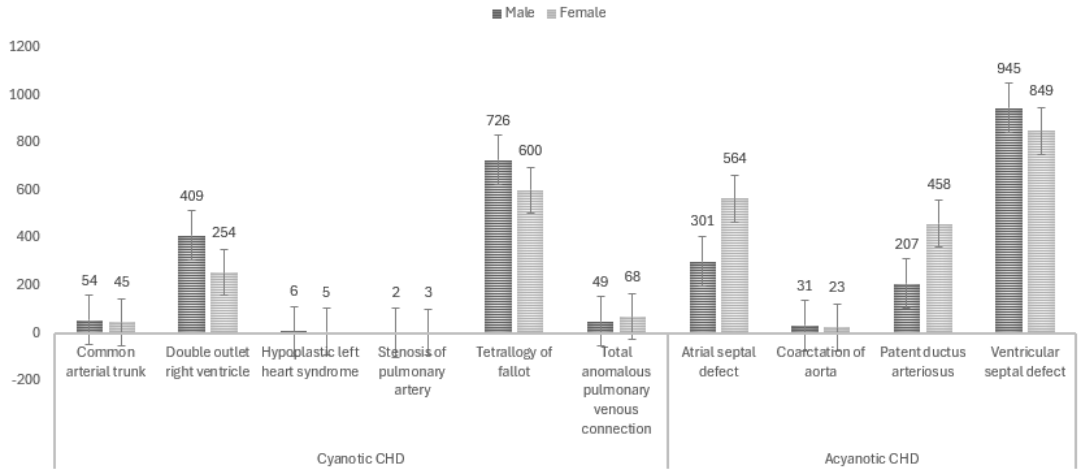

Figure 2 Sex Distribution of Pediatric Patients with Cyanotic and Acyanotic Congenital Heart Disease

The most common comorbidity in acyanotic patients (Figure 3) is fluid and electrolyte imbalance, with 231 cases, while no cases are reported in the cyanotic group. Ventricular septal defect (VSD) is the most frequently associated congenital heart defect in cyanotic patients, with 224 cases, whereas atrial septal defect (ASD) is more prevalent in acyanotic patients, with 145 cases. Other comorbidities, such as anemia, pleural effusion, atelectasis, and acidosis, have been observed in both groups with relatively similar distributions. Additionally, Down syndrome is more prevalent in acyanotic patients (43 cases) compared to cyanotic patients (10 cases). These findings suggest that specific comorbidities, such as fluid and electrolyte imbalance and Down syndrome, are more commonly associated with acyanotic congenital heart disease, while VSD is predominantly found in cyanotic patients.

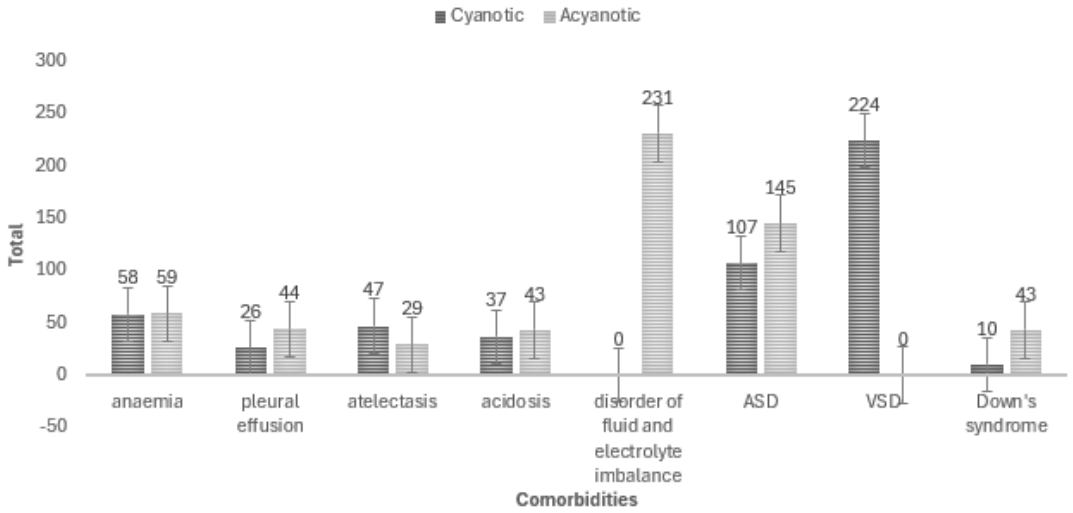

Figure 3 Distribution of Comorbidities in Pediatric Patients with Cyanotic and Acyanotic Congenital Heart Disease

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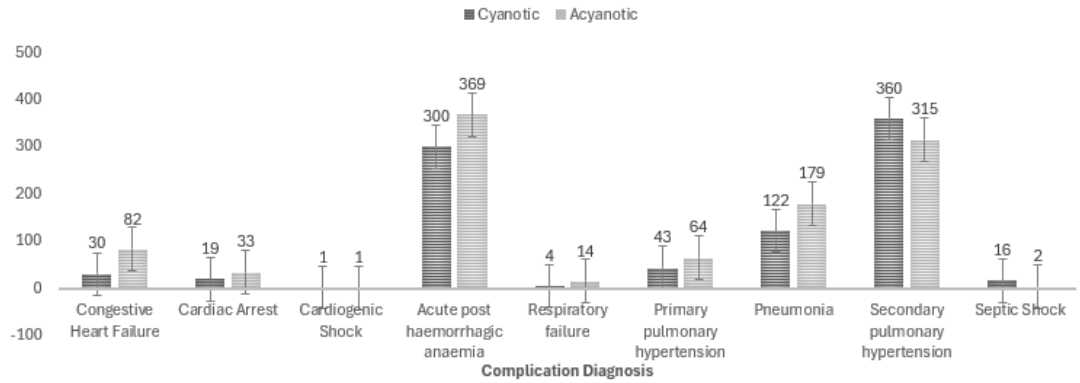

Figure 4 Distribution of Complications in Pediatric Patients with Cyanotic and Acyanotic Congenital Heart Disease

Based on Figure 4, the most common cardiac complication in cyanotic CHD patients was congestive heart failure (CHF), with 30 cases (3.35%). Meanwhile, the most prevalent non-cardiac complication was secondary pulmonary hypertension, affecting 360 cases (40.22%). For acyanotic CHD patients, the most frequent cardiac complication was also congestive heart failure (CHF), with 82 cases (7.69%). In the non-cardiac complication category, the most common condition was acute post-hemorrhagic anemia, recorded in 369 cases (34.62%).

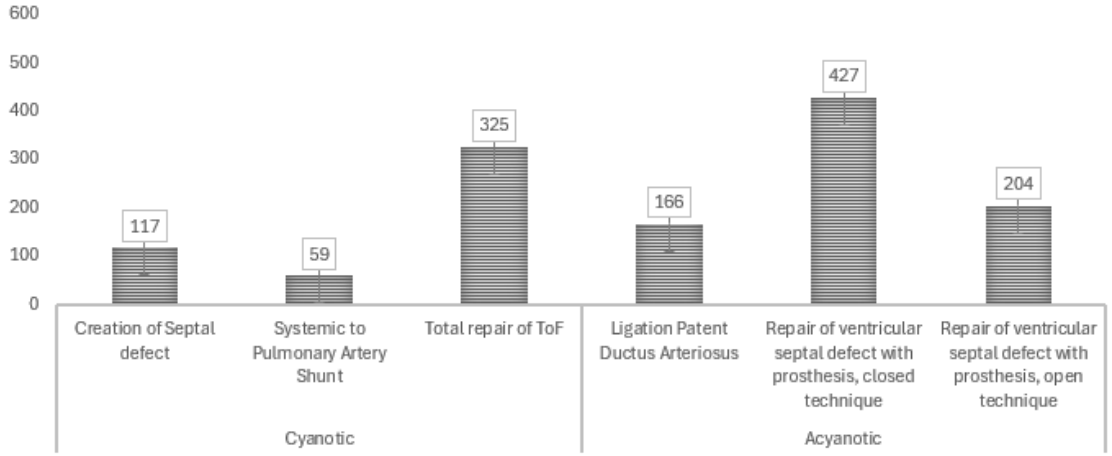

Figure 5 Distribution of Medical Interventions in Pediatric Patients with Cyanotic and Acyanotic Congenital Heart Disease

Based on Figure 5, among cyanotic patients, the most frequently performed procedure is the total repair of Tetralogy of Fallot (ToF) with 325 cases, followed by the creation of a septal defect (117 cases) and systemic-to-pulmonary artery shunt (59 cases). The creation of a septal defect, such as an atrial septostomy, is a palliative procedure used to improve systemic oxygenation by allowing mixing of oxygenated and deoxygenated blood between the atria,

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particularly in conditions with restricted intracardiac mixing or obstructed pulmonary or systemic outflow.[9]

In the acyanotic group, the most common procedure is the repair of ventricular septal defect with prosthesis using a closed technique, with 427 cases, followed by the repair of ventricular septal defect with prosthesis using an open technique (204 cases) and ligation of patent ductus arteriosus (166 cases). These findings indicate that surgical interventions for cyanotic congenital heart disease primarily involve complex repairs such as ToF correction, while acyanotic cases are more frequently managed with ventricular septal defect closure, particularly using prosthetic materials.

Table 2 suggestes that cyanotic CHD patients are more likely to experience malnutrition and growth impairment compared to acyanotic CHD patients, highlighting the need for targeted nutritional interventions to improve their overall health and development.

Figure 6 indicates that the majority of congenital heart disease (CHD) patients were discharged after treatment, particularly those with Tetralogy of Fallot (1,262 patients) and double outlet right ventricle (635 patients). Mortality occurred most frequently within <48 hours and >48 hours in both conditions. Pulmonary artery stenosis and total anomalous pulmonary venous connection showed no recorded deaths or transfers to other hospitals, with most patients being discharged.

Table 2 Nutritional Status Pediatric Patients with Cyanotic and Acyanotic Congenital Heart Disease in 2023 (N = 62)

Nutritional Status		Cyanotic CHD n (%)	Acyanotic CHD n (%)
Weight for Age	Underweight	28 (45.16)	33 (24.3)
	Overweight	1 (1.61)	6 (4.4)
	Normal Weight	24 (38.71)	76 (55.9)
	Severely Underweight	9 (14.52)	21 (15.4)
Height for Age	Normal Height	19 (30.6)	90 (66.18)
	Short	41 (66.1)	21 (15.44)
	Very Short	2 (3.2)	25 (18.38)
Weight for Height	Normal	27 (43.55)	86 (63.2)
	Severe malnutrition	4 (6.45)	9 (6.6)
	Moderate Malnutrition	30 (1.61)	35 (25.7)
	Obesity	1 (1.61)	6 (4.4)

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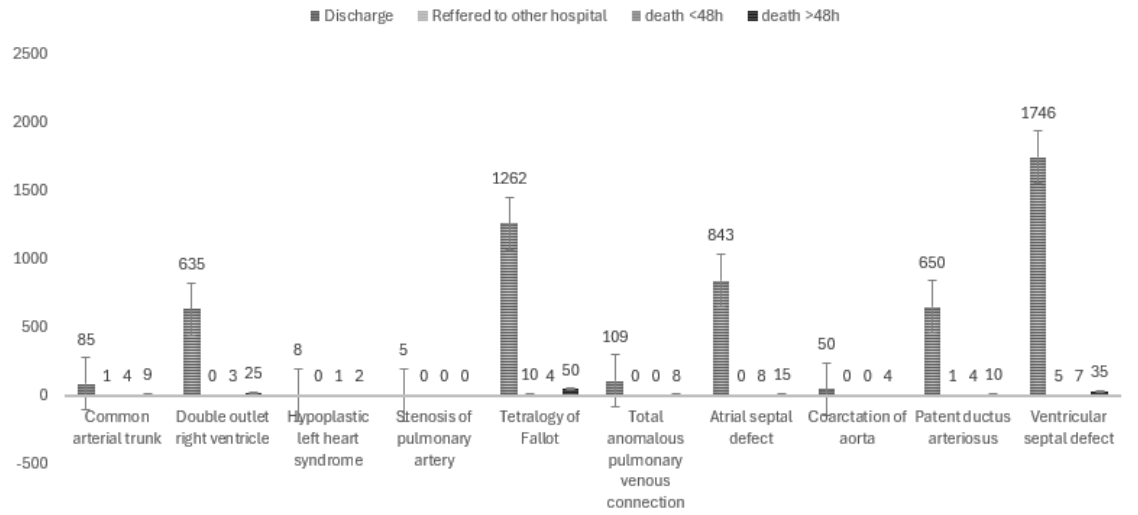

Figure 6 Clinical Outcomes of Pediatric Patients with Cyanotic and Acyanotic Congenital Heart Disease

The distinction between <48-hour and >48-hour mortality is clinically significant. Deaths occurring within <48 hours are often associated with critical preoperative conditions, delayed diagnosis, or hemodynamic instability upon admission. In contrast, mortality occurring after >48 hours may reflect postoperative complications, nosocomial infections, or progressive heart failure during hospitalization. This classification helps in identifying the timing and potential causes of death, thereby informing improvements in early intervention and perioperative care in pediatric CHD patients.

Ventricular septal defect (VSD) had the highest number of discharged patients (1,746 cases) but also recorded the highest >48-hour mortality (35 cases). Atrial septal defect (ASD) had 843 discharged patients, with 8 deaths within <48 hours and 15 deaths after >48 hours. Patent ductus arteriosus (PDA) recorded 650 discharges, with 4 deaths within <48 hours, 10 deaths after >48 hours, and 1 patient transferred. Coarctation of the aorta had 50 patients, with 4 deaths after >48 hours. In summary, most of the patients were discharged, although >48-hour mortality rates varied across different CHD conditions.

Discussion

Congenital heart disease (CHD) in children at the Rumah Sakit Jantung Harapan Kita (RSJPDHK) has shown an increasing trend from 2019 to 2023, despite a decline in 2020, which is suspected to be related to the COVID-19 pandemic. Limited access to healthcare and prioritization of services for COVID-19 were believed to be contributing factors. Children with

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CHD were at higher risk for COVID-19 infections, particularly those with comorbidities such as prematurity.[1,2]

CHD in children, especially in the under-five age group, exhibits a high prevalence, with 3,356 patients (59.85%) diagnosed during the period from 2019 to 2023. Children under five often undergo scheduled health examinations, which include monitoring growth and development as well as vaccinations, allowing for earlier diagnosis of CHD.[3] Certain types of CHD, such as ventricular septal defect (VSD), may close spontaneously as the child grows, highlighting the importance of developmental factors in prognosis.[3] The prevalence of CHD decreases with age due to surgical interventions at a young age, which reduce complications.[4] The status of children who do not need intervention may also improve as a result of physiological adaptation, which includes enhanced heart muscle strength and lower pulmonary vascular resistance.[5]

According to Figure 1, the data show that 66.35% of children under five have cyanotic CHD, a much higher rate than the 7.5% found in a study conducted by Ossei I et al. (2020) at Komfo Anokye Teaching Hospital (KATH) in Ghana, where better awareness, specialized doctors, and improved record-keeping contributed to CHD detection.[10] While the KATH study emphasizes early detection and a trained healthcare network, it also notes missed diagnoses even with advanced techniques, suggesting ongoing challenges in identifying CHD.[9] A different study at Aminu Kano Teaching Hospital found that acyanotic defects like ventricular septal defect are more common, though Tetralogy of Fallot was the most frequent cyanotic defect, highlighting that complex cyanotic cases often lead to early demise without surgical intervention. [8,11,12] These studies highlight the need for early diagnosis and specialized care to improve survival chances. Neonatal screening with pulse oximetry can identify critical CHD within an hour after birth, and prenatal ultrasound helps plan treatment, especially for severe conditions like Tetralogy of Fallot that require immediate intervention to prevent serious health issues or death. [6,7]

The age distribution of patients with acyanotic CHD in Figure 1 indicates that the highest number of patients was found in those under five years old, with 1,877 patients (55.57%). The highest cases in the under-five and five to nine age categories were ventricular septal defects, with 1,103 patients (32.65%) and 383 patients (11.34%), respectively. VSD is often detected earlier through routine health examinations conducted on infants and young children. Research by Pasha W et al. (2023) indicated that VSD accounts for approximately 31.5% of all diagnosed cases of acyanotic CHD in children.[13]

The intensity of health monitoring for young children contributed to the high prevalence of both cyanotic and acyanotic CHD in this age group. Studies showed that children diagnosed with CHD at an early stage tend to receive better care and more frequently underwent necessary

surgical procedures, which enhances their survival chances and reduces the total number of cases diagnosed at older ages.[10,12] This suggested that children who successfully navigate the critical period with appropriate care are likely to live with more stable conditions, thereby reducing the prevalence of cyanotic CHD among older children.

Based on Table 1, the number of female children experiencing CHD was higher than that of male children. There are a number of potential causes for the increased incidence among females. Genetic and hormonal factors might play a role in the development of CHD. Research by Ko suggested that genetic variations affecting heart development might have different impacts based on sex.[14] Additionally, environmental and prenatal factors, such as exposure to infections or medications during pregnancy, might also contribute to the increased risk of CHD in females.[15] These findings underscore the differences in prevalence and long-term impacts of CHD based on sex.

Research by Parvar et al. (2023) indicated a higher prevalence of ToF in males with a p-value <0.0001, which is consistent with Figure 2 showing that more male children had cyanotic CHD than female children.[16] Other studies noted that the incidence ratio of ToF between males and females ranged from 2:1 to 3:1, influenced by genetic and hormonal factors during embryonic development.[17] Research by Van der Ven JPG (2019) also indicates that the symptoms of ToF in male children tended to be more severe, leading to quicker and more frequent diagnoses compared to females, although the actual prevalence might not differ significantly.[18] This data emphasized that while the overall prevalence of CHD was higher in females, specific cases such as ToF in males aligned with international literature, highlighting the importance of sex in research and early detection strategies for CHD.

In Figure 2, it was shown that female children more frequently experienced acyanotic CHD. This finding did not align with a study conducted by Parvar SY (2023), which indicated that male children were most commonly associated with acyanotic CHD.[16] A study conducted by Namuyonga J in 2020 in Uganda provided insights into the prevalence of VSD, reporting that spontaneous closure of septal defects occurred more frequently in males than in females.[19] A meta-analysis indicated that female sex was a risk factor for CHD in Down syndrome.[20]

Figure 3 illustrates that comorbidities in patients with cyanotic CHD most often include congenital defects, such as ToF, which are frequently associated with other structural abnormalities.[9] These defects cause oxygenated and deoxygenated blood to mix, resulting in cyanosis. Ventricular septal defect (VSD), the most common congenital defect, affects blood flow by allowing blood from the left ventricle to return to the right ventricle, leading to pulmonary circulation overload, pulmonary hypertension, and heart failure.[21] However, in patients with

acyanotic CHD, the most frequently involve gastroenterological and metabolic disorders, with the most common complaints related to fluid and electrolyte imbalances (231 complaints; 22.8%). These disorders arose from suboptimal heart function, affecting the perfusion of vital organs such as the kidneys and gastrointestinal tract, leading to electrolyte imbalances, dehydration, and metabolic disturbances [22]

Abdominal organ hypoperfusion can impair electrolyte absorption in the intestines, thereby worsening the clinical condition of patients with acyanotic congenital heart disease (CHD). In particular, conditions such as patent ductus arteriosus (PDA) increase cardiac workload, disrupt fluid and electrolyte balance, and negatively affect growth through inadequate nutritional intake.[23,24] Based on the study by Putri and Ariwibowo (2023), both cyanotic and acyanotic CHD are significantly associated with growth impairment in toddlers, with cyanotic CHD exerting a greater effect due to chronic hypoxemia that leads to appetite suppression, increased metabolic demands, and long-term malnutrition.[24]

These findings are consistent with the present study, which not only supports the relationship between CHD and growth delay but also provides novel insights into the pathophysiological mechanisms underlying growth disturbance in acyanotic CHD. Specifically, this study highlighted the role of abdominal hypoperfusion, particularly in PDA, in disrupting intestinal electrolyte uptake and contributing to nutritional deficiencies. This mechanism further aggravates fluid-electrolyte imbalance and increases metabolic demands, thus compounding the growth impairment. While the referenced study differentiates the impact of cyanotic and acyanotic CHD based on the severity and duration of malnutrition, chronic versus acute. The current findings enrich this perspective by offering a physiological explanation for growth failure in acyanotic CHD, reinforcing its multifactorial etiology.

Figure 4 shows that the most common cardiac complications in patients with both cyanotic and acyanotic CHD are congestive heart failure (CHF). In cyanotic CHD, such as ToF, chronic hypoxia and inefficient blood flow increase the workload on the heart and stimulate the production of pro-inflammatory cytokines such as TNF-α, which exacerbates cardiac muscle damage and triggers CHF.[25] Pulmonary hypertension in cyanotic CHD also contributes to heart failure.[26,27]

In patients with cyanotic CHD, such as ToF, chronic hypoxia stimulates polycythemia, increasing blood viscosity and further burdening the heart. The primary non-cardiac complication in cyanotic CHD is secondary pulmonary hypertension (PH), which occurs due to abnormal blood flow and hypoxia, leading to increased pressure in the pulmonary arteries and right ventricular

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hypertrophy, which can worsen heart failure and develop into Eisenmenger syndrome.[26] The prevalence of PH in patients with cyanotic CHD can reach 50% or more.[27]

In acyanotic CHD, such as VSD or atrial septal defect (ASD), left-to-right shunting causes volumetric overload on the heart, increasing the workload on the left ventricle. Risking the occurrence of CHF in due time.[28] The primary non-cardiac complication in acyanotic CHD is acute post-hemorrhagic anemia, which can occur due to volume overload and bleeding associated with medical procedures or other complications such as aneurism or Eisenmenger syndrome, further compromising the patient's hemodynamic status.[3] Early management and surgical intervention are crucial to prevent further complications in both types of CHD.[29]

Corrective surgery is the most common method used to fix the anatomical flaws in individuals with cyanotic CHD especially ToF. Because it treats every aspect of the abnormality, increases lung blood flow, lessens cyanosis, and improves quality of life, this technique is regarded as definitive therapy.[30] Early repair between the ages of 3 to 11 months can reduce the risk of electrophysiological and hemodynamic complications and improve survival. [31]

Pediatric patients with acyanotic CHD, including VSD, may benefit from medical therapies such as transcatheter or surgical correction of the VSD with prosthetic closure.[32] For patients with high surgical risk, including neonates, premature infants, or those with comorbidities, as well as for muscular or perimembranous VSD types, transcatheter intervention is recommended.[32] A less invasive operation, a quicker recovery, and fewer problems are among the benefits. For complex conditions, surgical intervention remains the gold standard due to its ability to address structural abnormalities and achieve sustained long-term outcomes.[32]

In children with cyanotic CHD, Z-score results indicate growth disturbances and stunting due to chronic hypoxia, which increases the body's energy requirements. This illness impairs appetite, interferes with metabolism, and causes less physical activity. Hypoxia also affects nutrient absorption and bone growth, worsening the child's nutritional status, making them more susceptible to infections and other complications. This problem was made worse by malnutrition and gastrointestinal issues, which frequently led to long-lasting growth abnormalities within the first 1,000 days of life.[33]

Conversely, children with acyanotic CHD generally exhibit normal weight and height, as better blood flow to the lungs supports blood oxygenation and growth. Hypoxia is less severe in acyanotic congenital heart disease, facilitating adequate energy availability for growth. These children also tend to have good appetites and do not experience nutritional status issues, resulting in a lower prevalence of malnutrition compared to children with cyanotic CHD.[34,35]

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Figure 6 illustrates the outcomes of interventions in pediatric patients with CHD, revealing a significant number of patients who were discharged. Research by Hasan et al. (2023) indicated improved clinical outcomes were observed in pediatric patients with both cyanotic and acyanotic CHD following appropriate interventions, such as surgical correction or catheter-based procedures, which resulted in enhanced oxygenation, reduced symptom burden, and improved growth parameters.[36] Generally, pediatric patients with CHD, whether cyanotic or acyanotic, have varying prognoses depending on the type and severity of the defect. Many children with CHD can undergo effective surgical interventions, such as total repair for cyanotic CHD or defect closure for acyanotic CHD, which can enhance blood flow and oxygenation to tissues.[23,37] These procedures not only alleviate clinical symptoms but also improve heart function and reduce the risk of long-term complications, such as heart failure and pulmonary hypertension.[24]

Conclusion

A study conducted at RSJPDHK between 2019 and 2023 on the features of pediatric patients with congenital heart disease (CHD) produced a number of important conclusions. The years 2020 and 2023 saw the lowest and greatest incidences of CHD, respectively. Children under the age of five accounted for the bulk of cases, with acyanotic CHD predominating and female patients having a greater frequency.

Tetralogy of Fallot (ToF) was the most common diagnosis among cyanotic CHD cases, and children under five years old were the most affected age group. The most common diagnosis of cyanotic CHD was ToF in male patients, who also had the highest prevalence of congenital defects, including ventricular septal defect (VSD). Secondary pulmonary hypertension was the most prevalent non-cardiac complication, whereas congestive heart failure (CHF) was the most common cardiac problem.

Total correction of Tetralogy of Fallot was the most common medical procedure. VSD was the most prevalent diagnosis for acyanotic CHD patients, with the majority also occurring in children under five. Female patients had the highest prevalence of acyanotic CHD, with VSD being the most common diagnosis. Hepatological, metabolic, and gastroenterological conditions, particularly electrolyte imbalances, were frequently present as well. While acute post-hemorrhagic anemia was the most commonly observed non-cardiac complication, congestive heart failure (CHF) was the most prevalent cardiac complication.

In contrast to children with acyanotic CHD, who typically displayed normal weight, height, and nutritional status, children with cyanotic CHD primarily experienced low body weight, short stature, and malnutrition, according to nutritional status assessment. In terms of

treatment results, RSJPDHK's therapeutic approaches had a high success rate, as evidenced by the fact that most pediatric patients with both cyanotic and acyanotic CHD were released following medical therapy.

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