Original Article

Survival Status and Associated Factors among Under-Five Children Managed with Congenital Heart Diseases in Addis Ababa Ethiopia: A Retrospective Follow-up Study

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Abstract

Background
Congenital heart disease is the most prevalent congenital abnormality with a prevalence of 9 per 1000 live births. Despite the advancements in medical and surgical care, congenital heart disease is high in developing countries including Ethiopia. The aim of this study is to assess Survival status and associated factors of under-five children managed with congenital heart diseases in Addis Ababa, Ethiopia.

Methods
An Institution-based retrospective follow-up study design was used among under-five children managed with congenital heart disease. Data was collected by pretested checklist from 235 randomly selected patient charts. Kaplan-Meier survival analysis; log-rank test and cox proportional hazard were employed. SPSS version 26 was used for data analysis.

Result
A total of 224 charts were reviewed. Thirty four of them died whereas 190 of them were censored. The survival status of CHD was 84.8% to five years. Cox regression identified the following factors to be significantly associated with mortality: weight at admission (AHR=19.023; P=0.004), types of interventions (AHR=73.016; P=0.007), pre-operative condition (AHR=65.097; P=0.0001), family history of heart disease (AHR=10.81; P=0.003), maternal history of substance use (AHR=46.67; P=0.001) and maternal history of viral infection (AHR=52.034; P<0.0001).

Conclusion
This study showed that the survival status of all infants born with CHD was 84.8%. Mortality risk was decrease by 98.7% in surgically managed patients.

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Keywords: Congenital heart disease, Survival status, Addis Ababa, Ethiopia

Introduction

Congenital heart disease (CHD) is the most prevalent congenital abnormality with a prevalence of 9 per 1000 live births.[1] Africa, where facilities for early diagnosis and management of non-communicable diseases in the pediatric age group are frequently lacking, congenital heart diseases are a major health and socioeconomic concerns. [2] About 20–25% of CHD instances are critical and necessitate early intervention or surgery during the first year of life, even though the majority of CHD cases have moderate lesions that don't require treatment.[3]

CHD is a global health problem though poor and middle-income countries are affected disproportionately.[4,5] Hypoxemia may be a presenting symptom of critical congenital heart disease (CCHD), which includes anomalies that are likely to need care during the first year of life.[6] Coarctation of the aorta (COA), double-outlet right ventricle (DORV), tricuspid atresia (TA), interrupted aortic arch (IAA), hypoplastic left heart syndrome (HLHS), Ebstein anomaly (EA), dextro transposition of the great arteries (TGA), tetralogy of Fallot (TOF), and persistent truncus arteriosus (PTA) are the most common congenital heart disease.[6]

Following advancements in medical and surgical care, the prognosis of children born with severe CHD in affluent nations has changed. However, in some developing regions, access to therapy for the more serious diseases is still not available.[7] Congenital heart disease makes up approximately one-third of all congenital birth abnormalities, must be prioritized. This condition needs to be focused on if avoidable infant mortality and non-communicable diseases (NCDs) are to be eliminated to achieve sustainable development goal of child death less than 12/1000 birth by 2025.[8]

Congenital heart disease (CHD) is the leading cause of birth defects and the second leading cause of death in the first five years of life, next to infectious diseases.[9]

Congenital heart disease continues to be a leading cause of newborn death and morbidity, resulting in a significant personal and societal cost, despite amazing advancements in diagnosis and medical management.[10] According to data from Lancet's 2017 Global burden of disease; congenital heart disease was the underlying cause of an estimated 261, 247 deaths globally, a 34·5% decline from 1990 when the number of deaths was 398, 580. [11]
Although CHD patient survival rates have increased to 90% in industrialized sections of the world, the mortality rate is higher in developing nations, about 4 times higher than that of HICs, (4.9 deaths per 100,000 in HICs versus 1.2 deaths per 100,000 in developed regions).[12] The majority of developing nations in Asia and Africa have highest prevalence of heart diseases in children and young adults, including CHD; but the burden is underestimated mainly due to the poor outcome of African children with CHD.[11,13-14]

Ethiopia is one of the countries in the sub-Saharan Africa region. Ethiopia has made remarkable progress in tackling priority communicable diseases, maternal, newborn, and child health threats.[15,16]However, the prevalence of CHD among children diagnosed with congenital anomalies is 35.8%, slightly higher than the average worldwide prevalence of CHDs (33.3%) among all major congenital anomalies.[17] The mortality risk CHD patient with Down syndrome is 19%. [18-19]

The limitation of literature makes it difficult to determine the exact survival rate of under-five children with CHD in Ethiopia. There is no local study that aimed to determine survival status and associated factors among children managed with congenital heart disease in Ethiopia. This study is needed to fill a literature gap and to identify any modifiable factors related to survival status of under-five children in the study area. The aim of this study is to assess survival status and associated factors of under-five children managed with congenital heart diseases in Addis Ababa, Ethiopia.

Method and material

Research design and setting

An Institution-based retrospective follow-up study was conducted at Tikur Anbesa Specialized Hospital (TASH) and Cardiac Center Ethiopia (Children's Heart Fund of Ethiopia). The two public hospitals were purposively selected because they are the main cardiac centers in Ethiopia.

Study population

The study population were children aged five years and below who were diagnosed and managed for congenital heart disease in TASH and Cardiac Center Ethiopia during the study period.

Inclusion and exclusion criteria

All children managed by at least one cardiac intervention and managed during study period were included in this study. Those children managed at abroad (other country), with other major congenital anomalies and with incomplete documentation were excluded.

Sample size determination and sampling strategy

Data was collected from medical registry of 235 systematically selected under-five children managed with congenital heart disease. Pretested and structured data extraction checklists were prepared by reviewing different literatures and hospital medical registration charts.[15,20-23] The sample size was computed by using single population proportion formula with the assumption of 95% CI, 5% margin of error(d), p=0.833),[24] zα/2=1.96 and taking 83.3% under five survival proportion to five year in Malaysia.[3] Adjustment was done for major predictor variables associated in other study using double population proportion at 95% CI, zα/2=1.96, Zß = 80% power. The final sample size after adding 10% non-response rate was 235. After making sampling frame from 1 to N, each participants are selected every k^{th} (21), N = 4870. The random sampling was used to identify the first subject and then it continuous every 21^{st}.

Three BSc data collectors and one senior MSc supervisor were recruited and trained to ensure data quality throughout data collection process.

Operational Definitions

CHD was defined as patients having at least 1 hospital discharge, or a death certificate with a registered International classification of disease ICD-8, ICD-9, and ICD-10 diagnosis of CHD.[25] CHD lesion group 1(Persistent truncus arteriosus (PTA), Transposition of great arteries(TGA), double outlet right ventricles(DORV), double outlet left ventricles(DOLV), tetralogy of Fallout, and aorto-pulmonary septal defect), CHD lesion group 2(AVSD, Epstein's anomaly, total anomalous pulmonary venous return (TAPVR)), Lesion group 3(coarctation of the aorta, interrupted aortic arch (IAA), pulmonary atresia (PA), tricuspid atresia (TA)), Lesion group 4(ventricular septal defect(VSD)), Lesion group 5(atrial septal defect(ASD), Lesion group 6(Aortic stenosis (AS) Patent ductus arteriosus (PDA) Pulmonary artery stenosis (PS)) and all other CHD diagnoses not included in lesion groups 1 to 5).[1] Survival time was taken as the time from of diagnosis/management started to death in month as a result of congenital heart disease. Event was death as a result of congenital heart disease. Censored was taken to have occurred when incomplete information was available about the survival time (event not occurs, transferred) of individuals.

Data collection technique, instrument, and Quality control

The data collection was conducted by a chart reviews using 5% pretested hospital data extraction tool at Tazma Cardiac Center prepared by reviewing different kinds of literature [3-6,14,17] and through telephone interview of patient's families retrospectively about current survival status of the children. This instrument consists of five sections (Socio-demographic, Risk factor, Disease characteristics, Intervention and outcome) with different variables. The organized checklist was integrated into

the electronic data collecting tool (Kobo toolbox), and reviewed data was gathered with a mobile phone. The data collectors and supervisors were trained for three days on the study's objectives and data collection tools.

Data analysis process

SPSS version 26 was used to analyze the data.[26] For categorical variables, frequencies and percentages were utilized, whereas means or medians were used to explain continuous variables. To analyze the survival status under different conditions and at different time intervals, Kaplan-Meier survival analysis was employed. Log-rank test was employed to compare survival status in groups for univariate analysis and finding was significant if $P < 0.05$. To determine the adjusted effect of each variable on mortality, a single-variable Cox proportional hazards regression was applied. Variables having p values less than 0.25 were added to the Cox proportional hazards regression multivariate analysis. Adjusted hazard risk and p value used to interpret findings and considered significant if the 95% confidence interval (CI) excluded one. Non-collinear independent variables were incorporated into the multivariate Cox regression model, and the independent variables were examined independently from the outcome variable. Covariates fit multicollinearity check and doesn't varies with time interval (fit proportionality assumption) were included to bivariate and multivariate cox regression and their hazard ratio was analyzed to determine their effect on survival status.

Ethical consideration

Ethical clearance was obtained from Departmental Research Ethics Review Committee (DRERC) of school of nursing and midwifery, Addis Ababa University. The written ethical clearance was provided to Tikur Anbessa specialized hospital clinical directorate and to Ethiopian cardiac center to get legal permission for data collection. Informed consent was taken from all responsible bodies at registration offices to access the medical record and use confidentiality of all information reviewed. For participants who had no complete information on their medical chart, telephone interview was conducted and the informed consent was assured.

Results

Socio demographic characteristics

A total of 235 children managed with congenital heart disease were randomly selected from totally registered 4870 under-five children follow-up chart. Out of those, 11 of them were excluded (5 for being managed at abroad, 4 for incompleteness of charts, and 2 for having major chromosomal abnormality). Finally 224 charts (95.32% response rate) were used for analysis. According to descriptive analysis, 109(48.7%) and 115(51.3%) were male and female respectively. Of which 123(54.9%) of them were from Addis Ababa city and 101(45.1%) of them were from rural area and regional cities. The majority of mothers 190(84.8%) were between to 20-35 years old with mean age of 29.38. [Table 1]

Table 1. Socio demographic characteristics of Under Five Children Managed with Congenital Heart Diseases in Addis Ababa, Ethiopia, from Jan 2018 to Dec 2022 (n = 224)

Variables	Category	Total Number (%)	Survival Status	
			Censored Number (%)	Death Number (%)
Sex	Male	109(48.7)	90(82.6)	19(17.4)
	Female	115(51.3)	100(87.0)	15(13.0)
Gestational Age	Preterm	40(17.9)	20(50)	20(50)
	Term	147(65.6)	133(90.5)	14(9.5)
	Unknown	37(16.5)	37(100)	0

Table 1. Continued

Variables	Category	Total Number (%)	Survival Status	
			Censored	Death
			Number (%)	Number (%)
Age at Enrollment	Months	201(89.7)	168(83.6)	33(16.4)
	25-36 Months	19(8.5)	18(94.7)	1(5.3)
	>36 Months	4(1.8)	4(100)	0
Place of residency	Addis Ababa	123(54.9)	107(87.0)	16(13.0)
	Out of Addis Ababa	101(45.1)	83(82.2)	18(17.8)
Maternal age	20-35 Years	190(84.8)	167(87.9)	23(12.2)
	>35 Years	34(15.2)	23(67.6)	11(32.4)
Birth weight(g)	<2500g	30(16)	12(40)	18(60)
	2500g to 3999g	157(84)	141(89.8)	16(10.2)
	Unknown	37(16.5)	37(100)	
Weight at admission	≤ 5kg	45(20.08)	31(68.8)	14(31.1)
	>5kg	179(79.91)	159(88.8)	20(11.2)
Maternal level of education	Illiterate	92(41.1)	80(87)	12(12)
	Primary level	52(23.2)	42(80.8)	10(19.2)
	Secondary Complete	17(7.6)	12(70.6)	5(29.4)
	College diploma	27(12.1)	25(92.6)	2(7.4)
	Bachelor degree	27(12.1)	22(81.5)	5(18.5)
	Unknown	9(4.0)	9(4)	

Clinical characteristics

Table 2. Clinical characteristics of under-five children managed with congenital heart diseases in Addis Ababa, Ethiopia from Jan 2018 to Dec 2022 (n = 224)

Variables	Category	Total	Survival Status	
			Censored	Death
		Number (%)	Number (%)	Number (%)
Age at diagnosis	≤ 24 months	202(90.2%)	168(83.1%)	34(16.8%)
	24 -36 months	18(8%)	18(100)	0
	> 36 months	4(1.8%)	4(100%)	0
CHD lesion groups	Lesion group 1	29(12.9%)	21(72.4%)	8(27.6%)
	Lesion group 2	7(33.13%)	6(85.7%)	1(14.3%)
	Lesion group 3	26(11.6%)	14(53.8%)	12(46.2%)
	Lesion group 4	40(17.9%)	37(92.5%)	3(7.5%)
	Lesion group 5	18(8.03%)	17(94.4%)	1(5.6%)
	Lesion group 6	104(46.4%)	95(91.3%)	9(8.7%)
comorbidities	Yes	121(54%)	96(79.3%)	25(20.7%)
	No	103(46%)	90(90.9%)	9(9.1%)
Interventions	Medical/Pharma	12(5.3%)	3(25%)	9(75%)
	Surgical	168(75%)	146(86.9%)	22(13.1%)
	Catheterization	44(19.6%)	41(84.8%)	3(6.8%)
Family History of Heart disease	Yes	19(8.5%)	11(57.9%)	8(42.1%)
	No	200(89.2)	174(87%)	26(13%)
	Unknown	5(2.2%)	5(100%)	0
Maternal viral infection	Yes	12(5.4%)	2(16.7%)	10(83.3%)
	No	191(85.2%)	167(87.4%)	24(12.6%)
	Unknown	21(9.4%)	21(100%)	0

NB: CHD lesion groups [Lesion group 1(TGA, DORV, TOF and Aorto-pulmonary window), Lesion group 2 (AVSD, Epstein's anomaly with PS, ASD, TR and PDA, TAPVR), Lesion group 3 (CoA, IAA, TA, PA), Lesion group 4 (VSD), Lesion group 5 (ASD), Lesion group 6(AS, PS, PDA)]

Majority 202(90.2%) of enrolled children in this study were diagnosed to have CHD within the age of 24 months. The mean diagnosis time was 12.45 months. The most commonly diagnosed type of CHD was PDA 76(33.9%) followed by VSD 40(17.9%), PS 21(9.4%), ASD 18(8%), TOF 18(8%) and PDA with VSD 11(5%). The less commonly diagnosed CHD were TGA 4(1.8%), IAA 1(0.4), LVOO 2(0.9), AVSD 3(1.3%), Aortopulmonary window 3(1.3%), TA 2(0.9%), CoA 4(1.8%), DORV 2(0.9%), TAPVR 2(0.9%), Ebstein anomaly with PS, ASD,TR & PDA 1(0.4%), ASD with VSD 2(0.9%), PDA with ASD 1(0.4%) and ASD with PS 3(1.3%). According to CHD lesion group classification, most severe form of CHD lesion group 1 was diagnosed in 29(12.9%) cases and the majority of cases are mild form of CHD lesion group 6, 106(46.4%). In this study open cardiac surgery is the most common cardiac intervention with the frequency of 168(75%) followed by Catheterization 44(19.6%) and Medical/ Pharmacological intervention 12(5.4%). The mean time of surgical intervention was 25.22 months with minimum of first month and maximum of 56 months.[Table 2]

Kaplan-Meier survival status of under-five children managed with congenital heart diseases

The Kaplan-Meier survival analysis was conducted to determine survival status. The five year survival probability in this study was 84.8% and the log rank (Mantel cox) showed that, there is no statistically significance difference on survival probability between sex of children managed with CHD (X2 = 1.474 at 95% CI, P = 0.225). Survival status for those managed with non-critical CHD was 91.95% to first 12 months and 59.7% to five year with median survival time of 36 months. The Log rank (Mantel-cox) indicated that there is a difference between overall survival probability of children managed with critical and non-critical CHD (X2 =28.62; P < 0.0001).

Based on hierarchical classification of CHD groups, there is statistical significance between the distribution of survival time in different group of CHD lesions and the overall median survival time was 58 months at 95% CI (55, 61) LR = 31.4; P < 0.0001). (Figure 1)

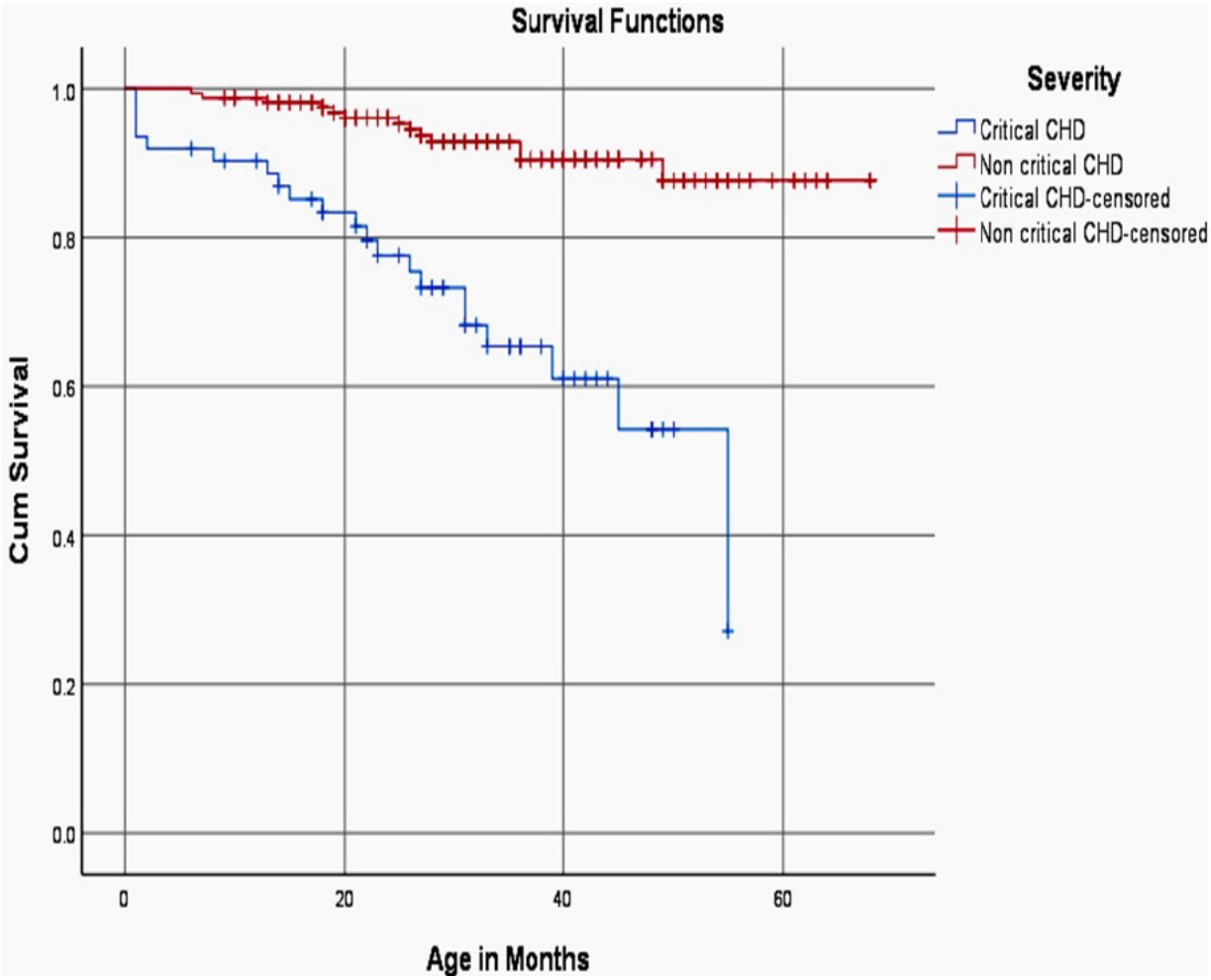

Figure 1. Hierarchical classification of CHD groups

Based on KP Meier analysis for other variables log-rank statistical test indicated significance in survival curve for Gestational age, APGAR score at first and fifth minutes, order of birth and weight at admission. It also show for maternal age, presence of associated comorbidities, CHD lesion and severity groups, Type of intervention, Genetic predisposition, maternal substance use and history of maternal viral infection (P Value <0.05) [Table 3].

Table 3. Median survival time and log-rank test survivors of under-five children managed with CHD Addis Ababa, Ethiopia from Jan 2018 to Dec 2022 (n = 224)

Variable	Category	Median survival time in months (95% CI)	Log rank test	P- value
Gestational age	Preterm	39(25, 52.7)	36.3	**0.0001***
	Term	56(52, 59)		
Birth weight	Low BW	22(17.35, 26.64)	79.612	**0.0001***
	Normal BW	61(57.94, 64.39)		
Weight at admission	≤ 5kg	55(42, 68)	10.96	**0.001***
	>5kg	61(58, 63)		
APGAR score at first minutes	<7	55(27.7, 82.28)	5.075	**0.024****
	7	58(54.5, 62.06)		
APGAR score at fifth minutes	<7	27(0, 67)	5.66	**0.017****
	7	56(52.7, 60)		
Economic status	Below average	41(35.9, 46.09)	6.665	0.083
	Average	32(29.14, 34.85)		
	Above average	32(23.51, 40.9)		
Maternal age	20-35	60(57.9, 63.6)	15.292	**0.0001***
	>35	49(33.1, 64.9)		
Presence of associated comorbidities	Yes	36(33.4, 38.6)	4.1	**0.043****
	No	33(29.55, 36.45)		
CHD severity groups	Critical	55(36.70, 73.26)	28.6	**0.0001***
	Non critical	63(60.8, 65.74)		
Type of intervention	Pharmacologic	31(11.37, 50.6)	47.7	**0.0001***
	Surgical	35(32.63-37.36)		
	Catheterization	34(26.7, 41.32)		
Employment status	Government	28(21.07, 34.93)	1.556	0.459
	Self	31(27.28, 34.7)		
	Housewife	36(32.9, 39.04)		
Family History of CHD	Yes	36(17.5, 54.35)	28.1	**0.0001***
	No	61(58 , 63)		
Maternal substance use	Yes	31(21.14, 40.86)	53.12	**<0.0001***
	No	60(57.398, 63.487)		
Over all		58 (55.5 , 61.46)		

NB: - **Significant (P-value < 0.05), *significant (p-value<0.01) and HR=1 is reference variable.

Bivariate and Multivariate Cox regression analysis of Factors associated to survival status of Under-five children managed with CHD

Multivariate cox regression identified that six covariates; weight at admission, types of intervention, preoperative condition, family with history of heart disease and maternal history of viral infection were significantly associated with survival status of children managed with CHD at P < 0.05. [Table 4]

Out of 224 study participants, children with weight ≤ 5kg are 19.02 times more likely to die at every time-point in month from 0 to 59 months of age than those admitted with weight greater than 5kg (AHR 19.02, 95% CI 2.542,142.925, P = 0.004). Children managed with medication were 73.02 times more likely at risk of mortality compared to cardiac catheterization and surgical intervention (AHR 73.02, 95% CI, 3.226, 1652.19; P = 0.007).

Surgical management has protective effect on mortality that morality was reduced by 98.6% in surgical management compared to others managements, [AHR 0.0136 at 95% CI 0.0006, 0.510, P = 0.31].

Children with poor pre-operative condition were 65.09 times more likely to die than those with good pre-operative clinical condition [AHR 65.09 95% CI, 11.32, 374.25; P < 0.0001)]. Children with family history of cardiac problem were 10.8 times at risk of mortality compared to those with no history [AHR 10.8, 95% CI, 2.218, 52.673: P = 0.003]. Children of any type of maternal substance user were 46.7 times more likely to die from congenital heart disease compared with those mothers did not use substance [AHR 46.7 95% CI: 4.405, 494.31; P < 0.0001].

Table 4. Bivariate and Multivariate Cox regression analysis to identify factors associated to survival status of Under-five children managed with CHD at Addis Ababa, Ethiopia from Jan 2018 to Dec 2022 (n = 224)

Variables	CHR (95% CI)	P-value	AHR (95% CI)	P- value
Gestational age				
Term	1		1	
Preterm	6.25(3.15, 12.4)	< 0.0001	2.678(0.443, 16.197)	0.283
Birth weight				
Normal	1		1	
Low	13.2(6.4, 27.17)	< 0.0001	1.43(0.203, 10.09)	0.719
Weight at admission				
>5kg	1		1	
≤ 5kg	3(1.51, 5.93)	0.002	19.023(2.542,142.925)	**0.004****
Severity group				
Non critical	1		1	
Critical	5.452(2.715,10.9)	< 0.0001	1.0567(0.089, 12.518)	0.965
Hierarchical classification				
Lesion group 6	1		1	
Lesion group 1	0.707(0.088, 5.714)	0.745	8.964(0.542, 148.056)	0.1253
Lesion group 2	1.415(0.577, 3.467)	0.448	14.617(0.937, 227.88)	0.056
Lesion group 3	0.184(0.049, 0.697)	0.013	1.11(0.11, 11.19)	0.983
Lesion group 4	0.121(0.015, 0.980)	0.048	0.633(0.0683, 5.87)	0.687
Lesion group 5	0.251(0.097, 0.653)	0.005	0.0417(0.001, 2.83)	0.14
Type of intervention				
Catheterization	1		1	
Surgical	2.001(0.598, 6.69)	0.260	0.0136(0.0006, 0.510)	0.90383
Pharmacologic	16.14(4.35, 59.79)	< 0.0001	73.013(3.226, 162.19)	**0.007****
Pre-Operative condition				
Good	1			
Poor	45.0(17.66, 114.6)	< 0.0001	65.1(11.322, 374.25)	**<0.0001**
Family history of heart disease				
No	1			
Yes	5.307(2.65, 10.60)	<0.0001	10.810(2.218, 52.673)	**0.003****
Maternal substance use				
No	1			1
Yes	9.1(4.42, 18.75)	<0.001	46.67(4.40, 49.31)	**0.001***
Maternal viral infection				
No	1		1	
Yes	16.17(9.59, 38.32)	< 0.001	52.034(7.32, 369.8)	**< 0.0001***

NB: - **Significant (P-value < 0.05), *significant (p-value<0.01) and HR=1 is reference variable.

Discussion

This retrospective follow-up study was conducted to assess the survival status and identify predictors of mortality for under-five children with congenital heart disease (CHD) treated at Tikur Anbessa Specialized Hospital (TASH) and the Ethiopian Cardiac Center (ECC). The study revealed that 84.8% of newborns with CHD survived to the age of five years. This survival rate is noteworthy, especially considering the numerous challenges faced by healthcare systems in developing nations, such as limited human resources and knowledge. The survival status observed in this study aligns closely with the findings of a recent systematic meta-analysis of 16 population studies, which reported pooled 5-year survival rates of 85.4% and 85.5%.[3]

The comparability of these survival rates suggests that the management of CHD in the studied hospitals is effective despite the limitations. The meta-analysis referenced indicates that even in resource-constrained settings, it is possible to achieve outcomes similar to those in better-resourced environments. This success may be due in part to the relatively high percentage of mild and moderate CHD cases in the study cohort. Specifically, the study found that 33.9% of the cases were patent ductus arteriosus (PDA), 17.9% were ventricular septal defects (VSD), 9.4% were pulmonary stenosis (PS), and 8% were atrial septal defects (ASD). These types of CHD generally have better prognoses and higher survival rates, contributing to the overall positive outcomes observed.[27]

By focusing on identifying and treating mild to moderate cases effectively, healthcare providers can significantly improve survival rates for children with CHD. The study highlights the potential for achieving comparable survival out-comes to those in more developed nations, even within the constraints of a developing country's healthcare system. This emphasizes the value of targeted healthcare strategies and the need for ongoing support and training for medical professionals in these environments to continue improving patient outcomes.

There is no statistical difference in survival status between male and female participants which is 82.6 % and 87% respectively (X2 = 1.474, P = 0.225). Although the survival status of children managed with CHD was high according to study conducted in Sweden that reveals the survival probability of males and females was 87% and 90% respectively. The findings in this study also indicate similarity on difference between survival status of both sex.[27] This finding was similar to the study conducted in other developing country Malaysia, where mortality rate of critical CHD was 34%.[3]

The mortality rate was anticipated to be high in the higher classification categories, as demonstrated by a study from Sweden, which reported a mortality rate of 64.07 (95% CI; P < .001) in lesion group 1.[27] However in this study, the hazard of death was increased by 14 times higher in lesion group 2 and 9 time higher in CHD lesion group 1 compared to the simplest type CHD lesion group 6, but statistically not significant (P = 0.056 and 0.125 respectively). The difference may be due to lack of adequate facility in our study setup to manage the most severe form of CHD in comparison groups.

A comprehensive study was conducted using nationwide Swedish health registries from 1980 to 2017 investigated survival trends in children with congenital heart disease (CHD). The study compared the mortality risk of patients with CHD to matched controls from the general population without CHD, employing Cox proportional regression models and Kaplan–Meier survival analysis. The study included 64,396 patients with CHD and 639,012 matched controls without CHD. Of these, 3,845 (6.0%) CHD patients died compared to 2,235 (0.3%) of the controls, highlighting a significantly higher mortality risk among those with CHD.[29]

When comparing these findings to the results of the retrospective follow-up study conducted at Tikur Anbessa Specialized Hospital (TASH) and the Ethiopian Cardiac Center (ECC), there is a notable difference in survival rates. In the Ethiopian study, 15.2% of the children with CHD died by the age of five, indicating a lower survival rate compared to the Swedish study. This discrepancy may be attributed to differences in healthcare infrastructure, resource availability, and possibly the severity and types of CHD cases treated in the two settings.

Conclusion and Recommendations

The survival status of infants managed with CHD was 84.8% to five years. Weight at admission, types of interventions, pre-operative conditions, family history of heart disease, maternal history of substance use and maternal history of viral infection were significantly associated with mortality of infants managed with CHD. Implementing cardiac surgical intervention is important to improve survival rate of children diagnosed with CHD. Findings of this study may give an insight for future researchers.

Limitation of the study

Non-generalizability of the finding to other place and population, limitations of retrospective study and lack of literatures in similar study area were the limitation of this study.

Authors' Contribution

GS, DS, YB and YT had conducted the proposal development; write up, conception, design, data analysis, interpretation and proof reading. Manuscript preparation and publication process are done by GS. YB and DS had also participated in data collection, data cleaning data entry and writ-up of the final thesis.

Conflict of interest

The authors declare that there is no Conflict of interest for this study.

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