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Frequency of Congenital Heart Disease in Neonates with Extra Cardiac Anomalies

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Abstract

Background

Diagnosis of congenital heart disease (CHD) in neonates with extra cardiac anomalies is effective in their clinical management and surgical outcomes. This study aimed to investigate the frequency of CHD in neonates with extra cardiac anomalies admitted to a neonatal intensive care unit (NICU).

Materials and Methods

This retrospective, descriptive study included all neonates with extra cardiac anomalies admitted to the NICU of Ali Ibn Abitaleb Hospital in Rafsanjan, Iran, from March 2016 until the end of September 2018. Data were collected through a researcher-designed checklist including demographic and disease information for neonates and their parents. The checklist was filled out according to the neonates' medical records. Moreover, CHD was diagnosed using echocardiography. Finally, the data were analyzed using SPSS version 18.

Results

From the 58 neonates, 35 (60.35%) were boys and 23 (39.65%) were girls. The mean age of the neonates was 5.27±6.9 days. The prevalence of CHD in neonates with extra cardiac anomalies was 37.25% (n=19). The most prevalent CHD anomaly was PDA with a rate of 78.9%. The highest prevalence of CHD was associated with musculoskeletal (50%, n=6 from 12), and genitourinary (43.8%, n=7 from 16) abnormality, respectively. There was no statistically significant difference between the CHD and non-CHD neonates in terms of neonatal gender and parental characteristics.

Conclusion

This study shows that 37.25% of neonates with extra cardiac anomalies have CHD anomalies; thus, it is recommended to refer all neonates with extra cardiac anomalies for cardiac examination.

Key Words: Congenital heart disease, Extra cardiac anomalies, Neonate.

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1- INTRODUCTION

Congenital heart disease (CHD) is the most common congenital malformation and the prevalent cause of death (1-2). According to previous studies, the prevalence of CHD is 0.8 to 0.5% in live term neonates, 10-25% in aborted fetuses, 3-4% in stillbirths, and 2% in premature babies (3-4). Environmental and genetic factors play major roles in the pathogenesis of CHD (5-6). The CHD incidence has been reported to range from 3.7 to 17.5 per 1000 live births or more (7-9), with 40-50% of cases being diagnosed in the first week of life and 50-60% in the first month (10). The association of CHD with extra cardiac malformations is common. Extra cardiac malformations are found in 7-50% of CHD neonates (11).

Extra cardiac malformations, regardless of the risk of surgery, are a major cause of mortality and morbidity in neonates. Moreover, some patients with CHD may require surgery or intensive care regardless of the heart condition. The association of CHD with extra cardiac anomalies leads to defective outcomes (12). Diagnosis of CHD in neonates with extra cardiac anomalies is effective in their clinical management and surgical outcomes. Various studies have investigated the incidence of extra cardiac anomalies in neonates with CHD (11-13). However, studies investigating the incidence of CHD in neonates with extra cardiac anomalies are limited. Therefore, this study aimed to investigate the frequency of CHD in neonates with extra cardiac anomalies admitted to a NICU.

2- MATERIALS AND METHODS

2-1. Study design and population

The population in this retrospective descriptive study included all neonates with extra cardiac anomalies admitted to the NICU of Ali Ibn Abitaleb Hospital in Rafsanjan, Iran, from March 2016 until the end of September 2018. The sample size was considered equal to the research population. Therefore, all the neonates were included in the study using census sampling. The inclusion criteria were diagnosis of at least one type of congenital extra cardiac malformation, minor or major, and echocardiography in neonates. Incomplete information in neonates' medical records was considered as the exclusion criterion.

2-2. Procedure

The data collection procedure was as follows. After obtaining permission from the Office of the Vice Chancellor for Research and Technology of the Rafsanjan University of Medical Sciences, Iran, and the Dean of Ali Ibn Abitaleb Hospital of Rafsanjan, the researcher (first author) referred to the NICU and selected neonates with extra cardiac anomalies at the desired time interval based on their medical records. Afterward, the required information was obtained from the neonates' medical records in the Medical Record Unit of the hospital retrospectively. Five neonates were excluded since echocardiographic results were not available in their records.

2-3. Measurement tool

Data gathering tools included a checklist for demographic and disease information from the neonates (age, gender, type of malformation), and a checklist for parental information (parental relatives, history of abortion, history of illness and drug use in mothers, history of congenital illness in parents, and history of congenital illness in the second- and third-degree relatives). The checklists were completed according to paraclinical procedures and the physician's observations included in the neonates' records. CHD was also diagnosed via echocardiography.

2-4. Ethical consideration

Ethical considerations in the study included the confidentiality of information and the extraction of the code of ethics (IR.RUMS.REC.1397.035) from the Ethics Committee on Biological Research of the Rafsanjan University of Medical Sciences, Iran.

2-5. Data analysis

After collecting the data, they were analyzed using descriptive (number and percent) and analytic (Chi-Square and Fisher's exact test) statistics in SPSS software version 18.0. The significance level was set at less than 0.05.

3- RESULTS

According to the results, the study sample consisted of 58 neonates with the mean age of 5.27±6.9 days. Of the total neonates, 35 (60.35 %) were boys and 23 (39.65 %) were girls. Parents of 23 (39.65%) of the neonates had familial relationships. Mothers had history of abortion in 19 (32.75%) of the neonates and history of taking chemical drug in the first trimester in 15 (25.86%) of the neonates. Mothers of 17 (29.31%) of the neonates had history of illness in the first trimester, and relatives of 11 (18.96%) of the neonates had history of CHD. There was no statistically significant difference between the CHD and non-CHD neonates in terms of neonatal gender and parental characteristics (**Table.1**). The frequency of CHD in neonates with extra cardiac anomalies was 37.25%, with the most common type being PDA with the frequency of 78.9%. The highest frequency of CHD was in musculoskeletal disorders (50%), and genitourinary disorders (43.8%), respectively (**Table.2**).

Table-1: Frequency of CHD based on characteristics of neonates and parents (n=58).

Variables	Number (%)	CHD, (Yes)	CHD, (No)	P-value
Neonatal Sex	Boy	11(31.42)	24 (68.58)	*0.39
	Girl	8 (34.78)	15 (65.22)	
Familial Relationship of Parents	Yes	5 (21.73)	18 (78.27)	*0.28
	No	14 (40)	21 (60)	
Mother, s History of Abortion	Yes	5 (26.31)	14 (73.69)	*0.59
	No	14 (35.89)	25 (64.11)	
Use of Drugs by Mothers in First Trimester	Yes	3 (20)	12 (80)	**0.63
	No	16 (37.21)	27 (62.79)	
Mother, s History of Illness in First Trimester	Yes	3 (17.64)	14 (82.36)	**0.36
	No	16 (39.03)	25 (60.97)	
History of CHD in Relatives	Yes	1 (9.09)	10 (90.91)	**0.58
	No	18 (38.29)	29 (61.71)	

*Chi-square test. ** Fisher Exact test.

Table-2: Frequency of CHD in neonates with extra cardiac anomalies (n=58).

Type of Anomalies	CHD	Number	Frequency	Total
Central Nervous System disorders	Yes	2	25	8
	No	6	75	
Face disorders	Yes	1	14.2	7
	No	6	85.8	
Genitourinary disorders	Yes	7	43.8	16
	No	9	56.2	
musculoskeletal disorders	Yes	6	50	12
	No	6	50	
Gastrointestinal disorders	Yes	1	25	4
	No	3	75	
Down Syndrome	Yes	1	20	5
	No	4	80	
Genetics disorders	Yes	1	16.6	6
	No	5	83.4	
Total	Yes	19	32.75	58
	No	39	67.25	

CHD: Congenital heart defect.

4- DISCUSSION

This study aimed to investigate the frequency of CHD in neonates with extra cardiac anomalies admitted to an NICU. The results showed that the frequency of CHD in neonates with extra cardiac anomalies was 32.75%. The frequency of CHD is reported differently in various studies (7-9). Environmental and genetic factors play a major role in the pathogenesis of CHD. Thus, frequency differences in various studies can be attributed to these factors. The results also revealed that the most prevalent type of CHD anomalies was PDA with the frequency of 78.9%. In studies by Hashemizadeh et al., and Aslanabadi et al., the frequency of CHD in neonates with imperforated anus was 30% and 50%, respectively, and atrial septal defect was more prevalent than the other types of CHD anomalies (14-15). Moreover, overlay ventricular septal defect was reported to be higher than the other types of CHD anomalies in neonates (5, 16), which is inconsistent with the results of the present study. Thus, further studies are required to investigate the cause of these differences. The results of this study showed that CHD had the highest association with musculoskeletal disorders and genitourinary disorders, respectively. In the study by Bensemlali et al. (17), the nervous and digestive systems were the most common associated anomalies. In the study by Dilber et al. (18), gastrointestinal anomalies were the most common associated anomalies, which is inconsistent with the findings of this study. Results of various studies have shown that neonates with both types of malformations (cardiac and extra cardiac) may have a higher risk of complications and mortality (7-9, 17, 18). Therefore, the American Heart Association has emphasized the importance and cost-effectiveness of screening neonates with extra cardiac anomalies for CHD using assistive paraclinical examination such as echocardiography (19). The results of the current study showed that there was no statistically significant difference between the CHD and non-CHD neonates in terms of neonatal gender and parental characteristics, which is inconsistent with results of other studies in this regard (17,18).

4-1. Study Limitations

Performing the study in a small urban area with a small sample size was the limitation of the present study. Therefore, similar studies in larger centers are suggested.

5- CONCLUSION

According to the results, the frequency of CHD anomalies was significant in neonates with extra cardiac anomalies. Thus, screening neonates with extra cardiac anomalies for CHD anomalies is recommended.

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7- CONFLICT OF INTEREST: None.

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