

Factors Leading to Congenital Heart Defects in Low Birth Weight Neonates

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ABSTRACT

Background: Low birth weight is associated with significant neonatal morbidity and mortality. Low birth weight may also be related to congenital heart defects. So far, limited data is available about the frequency of congenital heart defects in low birth weight neonates. This study was done to know the frequency of congenital heart defects among low birth weight neonates.

Aim: To determine the frequency of congenital heart defects in low birth weight neonates and to determine the factors leading to congenital heart defects in low birth weight neonates.

Study Design: Prospective cross-sectional study

Place and Duration of Study: Department of Neonatology Ward, Children Hospital, Lahore from 4th April 2012 to 4th October 2012.

Methodology: Three hundred and twenty neonates who were born low birth weight (<2500 grams) were included. The occurrence of congenital heart defects was determined in all neonates by echocardiogram. The congenital heart defects related factors were also found.

Results: Forty (12.5%) patients had congenital heart defects; of these, ventricular septal defect was seen commonly in 16 (40%) neonates. The most frequent factor related with congenital heart defect was cousin marriages which were present in 25 (62.5%) neonates.

Conclusion: The incidence of congenital heart defects is high. The most prevalent abnormality is ventricular septal defect. The most frequent aspect was cousin marriage.

Keywords: Low birth weight, Congenital heart disease, Factors

INTRODUCTION

The most critical criterion for assessing neonatal and child longevity is birth weight. Low Birth Weight (LBW) is a responsive predictor of socio-economic circumstances and tests the mother's and child's well-being indirectly. Low-birth weight is defined as babies with birth weight less than 2500 g regardless of the length of their gestation.¹ Birth weight plays an important role in infants' morbidity and mortality, childhood development and adult health.² In the UK at present 1-5% of women are obese at antenatal booking visits.³ The incidence of low birth weight babies is approximately 16% worldwide, 19% in developing countries, 7 % in developed countries and 31 % in South Asia. In Pakistan the LBW varies from 5-23 % in different parts.⁴ 16% of all neonates of women with a BMI of 19 are LBW while 4 % of newborns of women with BMI 30 are LBW.⁵

Other explanatory factors include maternity age (<20 and above 35), race, marital status, interval of birth, educational standard and socioeconomic conditions.⁶ Chronic diseases such as asthma, renal insufficiency, cardiovascular, autoimmune, endocrine, and infective disorders are medically significant risk factors for LBW prior to birth.

Low birth weight risk involves excessive blood pressure, asthma, starvation, bleeding, infection, anaemia, placental or foetal abnormalities, and multiple pregnancies in childbirth. The morbidities of LBWs are primarily due to

uteroplasy and low energy substratum transfer, which leads to neonatal complications such asphyxia of birth, hypothermia, aspirating to meconium, polycythaemia, hypoglycaemia, hypocalcaemia as well as thrombocythemia. (>32 weeks) LBW.^{7,8}

Low birth weight has more congenital heart defects as compared to overall population.⁹ About 650,000 to 1.3 million babies in the USA have congenital heart defects. Around 36,000 births are born every year and congenital heart defects are the leading and most frequent cause of birth failures.¹⁰ Congenital heart defects typically occur about 8 out of 1,000 newborns worldwide; this incidence is 8.1 % in low birth weight neonatal population.¹¹

A recent study conducted in children presented to OPD in children hospital, Lahore Pakistan shows ventricular septal defect is the most common congenital heart defect encountered in 43% followed by atrial septal defect in 2% in children of our population.¹²

The aetiology of 90% of the congenital heart defects is multifactorial¹³ and consanguinity may be a significant factor accounting for 49%, male gender 60% mother illness 14% and family history 14%.¹⁴ About 30% of all malformation is genetic in origin and congenital heart defect is one of them.^{15,16} Compared to low birth weight, the mortality rate was 12.7% for a child with congenital heart defects, who had a 1-year mortality rate of 44%.¹⁷ Mortality was much more likely to indicate that individuals with extreme congenital heart abnormalities had a cause

able role in mortality themselves.¹⁸ Any children with heart defects suffer from developmental disabilities or other learning challenges.^{18,19} With the feasibility of foetal echocardiography, notable improvements in the occurrence of CHD were noticed.^{20,21}

Any studies have been conducted on the occurrence of severe or complex CHD of foetal echocardiography. In general, foetal echocardiography may comparatively easily be detected in cases of severe heart physiological abnormalities and CHD patterns in secondary and tertiary referral clinics may be tertiary prior to birth.^{22,23} In secondary centres the incidence of basic forms of CHD may be more important as patients with these lesions never reach tertiary centres during the foetalperio.²⁴

MATERIALS AND METHODS

This cross-sectional study was carried out on 320 cases in the Neonatology ward of The Children Hospital Lahore from 4th April 2012 to 4th October 2012. A total of 320 patients who met the inclusion requirements have been inscribed. Those neonates who had low birth weight, age less than 28 days, both male and female were included in the study and Down, Edward syndrome, Patau, Di George, Turner Syndrome, William Syndrome, Holt Oram, and Goldenhaar Syndromes were not included when diagnosed on Chromosomal Examination. The data was entered and analyzed through SPSS-17.

RESULTS

The mean age of children was 11.30±5.42 days. Congenital heart defects were present in 40 (12.5%) patients, while it was not present in 280 (87.5%) patients (Table 1).

Table 1: Demographic information of the children

Variable	No.	%
Age (days)		
1-7	149	46.6
8-14	75	23.4
15-21	66	20.6
22-28	30	9.4
Congenital heart defects		
Yes	40	12.5
No	280	87.5

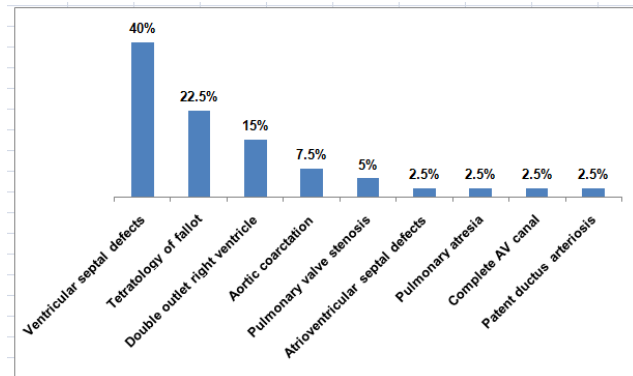


Fig. 1: Distribution of patients by types of congenital heart defects (n=40)

Ventricular septal defect in the 40 case cases was present among 16 (40%) neonates, 9 (22.5%) neonatstetrology, 6

(15%) aortic neonate coarction, Septal Atrioventricular defect in 3 (7,5%) newborn, double ventricular in 2 (5%) neonates and 1 (2,5%) neonates. Neomatous neonates were reported in the 40 cases of congenital cardiovascular disease. Atrioventricular septal defect was found in the 3 (7.5%) neonates (Fig. 1). Male gender was present in 23 (57.5%) neonates of the total 40 cases, cousin marriage in 25 (62.5%) neonates, maternal illness in 16 (40%) neonates, and family history of CHD in 11 (27.5%) neonates (Fig. 3)

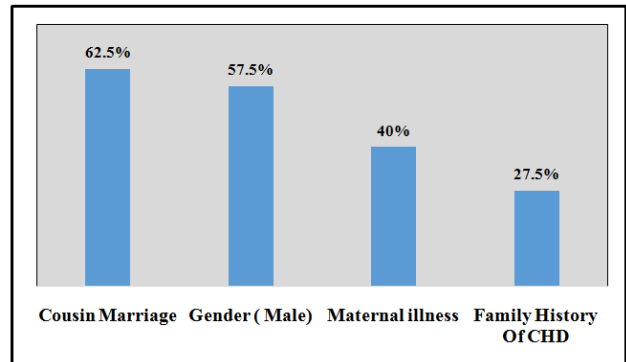


Fig. 2: Distribution of patients by factors associated with congenital heart defects (n=40)

DISCUSSION

This research examined the relationship of low birth weight of the neonate and congenital heart diseases and found that CHD was elevated in low birth weight neonates, i.e. 12.5%. Previously, the occurrence of congenital heart abnormalities in neonates was mainly studied.

The study on 760 babies of birth weight <1000 g was carried out by Kecskes et al.²⁵ Forty-seven babies with serious CHD were found, which was 2.3%. They conducted on 760 infants with birth weight <1000 g was carried out. 47 children had significant CHD, which resulted in a 2.3 percent rate. Congenital heart defects occurrence was smaller in their sample than ours, that is to say, 12.5%. In the present study, the echo cardiographer was also used to diagnose CHD. In their analysis, the most prevalent condition was a ventricular septal defect in 53.2% of the patients.

We also found the most common VSD, i.e. 40% of cases. The second most common in 17% of cases was aorta coarctation. The Coarctation was found to be approximately equal in our sample (15%), but in our sample, this was ranked third.

In this study, the tetralogy of Fallot was the second most common disorder i.e. present in 22.5% of patients while they did not observe less common i.e. in 6.4% of patients. The frequencies of other pathologies were as under pulmonary atresia (6.4%), and double outlet right ventricle (4.2%). These pathologies were also seen in a lesser frequency i.e. 2.5% and 5%, respectively.

Two hundred and eighty-one neonate babies were tested by echocardiography for CHD identification in a report by Godfrey et al.¹¹ CHD is significantly higher in 19 children (4.4 percent) than the overall 5-8/1000 population (P<.0001). According to Walsh¹⁹ tetralogy of Fallot 18.6%, aortic coarctation 11.5% complete AV canal 9.1%,

pulmonary atresia 8.2 %, and double outlet right ventricle 7.6 % were found to be frequency cardiac defects in low birth weight and extremely low birth weight.

Heart abnormalities are associated with different risk factors. In our findings, the most prominent cause was consanguine marriages (62.5%) of maternal illness. In another study by Haq et al.¹⁴ 49% were children of consanguineous marriages among the 250 cases of CHD in their study. In Northern India, the incidence of CHD (3.37% of 741 children) was higher than in non-consanguine marriage, (1.15% for 980, 25 children).²⁶ In Pakistani culture, parents decide to marry both sons and daughters. It was argued that social and cultural rather than any monetary arrangement was the reason for inclinations towards bloodless unions.²⁷

Maternal co-morbidities were responsible for 40% of CHD. Haq et al.¹⁴ contributed maternal co-morbidities in 14% of CHD cases. In addition to the reasons that have been identified as a mom, use of antibiotics during breastfeeding and oral contraceptives, the risk of CHD in mothers has been increased in the research carried out in Egypt separately for Down's citizens.

CONCLUSION

The neonates with a lower birth weight have a high prevalence of CHD. The septal defect in the ventricular was the most prominent one followed by tetralogy. Contagious marriages were seen among the parents of the majority of neonates suffering from CHD. The maternal illness was also responsible for the development of CHD. This indicates that all newborns with a low birth weight should be echocardiographically tested for CHD.

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