

**Ministry of Higher Education
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University of Diyala
College of Medicine**



Incidence Of Congenital Heart Disease In Preterm Infants

**Submitted to the Council of the College of Medicine, Diyala University, In
Partial Fulfillment of Requirements for the Bachelor Degree in Medicine And
General Surgery.**

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(يَا أَيُّهَا الَّذِينَ ءَامَنُوا إِذَا قِيلَ لَكُمْ تَفَسَّحُوا فِي الْمَجَالِسِ فَافْسَحُوا يَفْسَحِ اللَّهُ لَكُمْ
وَإِذَا قِيلَ أَنْشُرُوا فَأَنْشُرُوا يَرْفَعِ اللَّهُ الَّذِينَ ءَامَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ
وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ)

(المجادلة: ١١).

**I certify that the article entitled
(Incidence of Congenital Heart Disease In Preterm
infants)**

**is done under my supervision by the student
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Abstract:

Background: Preterm delivered babies are at a risk of many complications, some of them are life threatening. These complication may develop due to premature delivery and others are associated.

Objective: To search for incidence of congenital heart disease associated with premature delivery.

Patient and method: The study is a cross sectional study on the preterm babies delivered in Al-Batool teaching hospital in July 2022 to January 2023. A self prepared questionnaire was used for this purpose. Gestational age was calculated based on the last menstrual period provided by mothers. Echocardiography was done by specialist senior to identify the presence and types of congenital heart disease, all were also classified into cyanotic, a cyanotic according to history. If there is more than one type of heart defect ,it was considered as complex congenital heart disease. SPSS version 16 was used for statistical analysis.

Result: Total number of births was 1616, 60(3.71%) out of them were having congenital heart diseases of different types. In Preterm babies the rate was 8% the detect were: Patent ductus Arteriosus(n=10,26%),Atrial septal defect(n=8,21%),Ventricular septal defect (n=7,18%),Complex of congenital heart disease (n=7,18%),Transposition of the great Arteries (n=4,10%),Tetralogy of Fallot (n=2,5%),while full term babies the rate 1.9%, p value was (0.000). 13% of the cases were cyanotic heart disease and 87% were a cyanotic. Other systemic anomalies in the sample of preterm babies in the study where 11.7% only 2 (3.4%) of the cases had genetic analysis.None of the mothers were smokers, or congenital heart disease,but 13% of them had coexistent systemic disease (Diabetes mellitus, Hypertension).

Conclusion : The incidence of congenital heart disease was higher in Preterm delivered than full term babies. Mostly in the group ASD and complex heart defects.

Key words: Preterm, congenital heart disease, incidence.

Introduction

Preterm birth has been defined as any birth before 37 weeks completed weeks of gestation. An estimated 15 million infants are born preterm, with resulting complications . It is the principal cause of an estimated one million neonatal deaths annually and a significant contributor to childhood morbidities. Low and middle income countries (LMIC) carry a higher burden of disease attributed to preterm birth. The World Health Organization (WHO) defines preterm birth as any birth before 37 completed weeks of gestation, or fewer than 259 days since the first day of the woman's last menstrual period (LMP)(1,2).

Causes of preterm birth are complex and the pathophysiology that triggers preterm birth is largely unknown, however, contributing maternal, foetal and placental predisposing factors have been identified. The most common of these include: antepartum haemorrhage or abruption; mechanical factors such as uterine over-distention and cervical incompetence; hormonal changes; and, bacterial infection and inflammation (3).

Congenital heart defects (CHDs) are the most common congenital anomaly, occurring in approximately 6 to 10 infants per 1000 live births. While advances in surgery have improved outcomes for term and near-term infants with CHDs, for those born very prematurely (28-32 weeks gestational age (GA)) or extremely prematurely (<28 weeks GA), neonatal heart surgery is often infeasible or associated with excess risk. Therefore, consideration of cardiac intervention is typically delayed to allow these infants to grow and develop(4).

CHD and PTB(Preterm birth) are therefore two of the leading causes of infant mortality and disability of perinatal origin (5). Although known associations exist between congenital anomalies and PTB, few specific data exist regarding the risk of PTB for CHD. Most studies report results of hospital-based studies of the clinical

management and outcomes of preterm infants with CHD (6-8). One previous population-based study reported a higher risk of PTB for newborns with CHD (9). This study did not assess the role of associated anomalies or the extent to which risk of PTB for newborns with CHD may be due to spontaneous versus medically induced PTB (10). Moreover, few data are available on the associations between specific categories of CHD and PTB (11).

Reported infant mortality rates for newborns with CHD and preterm birth range from 20% to 65% with most of the deaths occurring during the first 28 days of life . There is some evidence suggesting that progress in medical and surgical management of newborns with CHD, and/or specifically those with PTB, has resulted in more favorable outcomes for infants undergoing cardiac surgery (12). However, by far most of the available literature looking at the impact of PTB on the outcomes of CHD are based on hospital series and concern essentially cases of cardiac surgery in specialized centers (13,14,15).

In the only previous population-based study reporting on the impact of PTB on the risk of infant mortality for newborns with CHD, the main focus was on the relation between risk of PTB and presence of CHD. The authors also reported descriptive data on the risk of infant mortality for CHD associated with PTB. They found that the overall infant mortality rate for newborns with CHD was 13%, whereas for the subgroup of preterm infants with CHD, risk of mortality was 20%. This study did not examine the role of associated anomalies, the degree of severity of CHD and the effects of potentially confounding factors, notably multiple pregnancies and intrauterine growth restriction (IUGR) on the risk of mortality associated with preterm birth for newborns with CHD (16).

Aim of the study

Despite recognition that premature infants with CHDs are a very vulnerable population, little is known about its epidemiology in premature infants. Prior epidemiologic studies have largely focused on term infants. In this study, we will demonstrate the prevalence of CHD among the preterm infants in Diyala province.

Patients and methods

The study is a cross sectional study on the preterm babies in Al-Batool teaching hospital for maternity and children in the period from July 2022 to January 2023.

A self prepared questionnaire was used for this purpose, It included the data of patients and ages, genders, weight, gestational age, the existence of CHD, history of CHD in the family, age of mother, mode of delivery, any other anomalies, any other chronic diseases of the mother, history of maternal smoking and any diseases during pregnancy (gestational DM, gestational HTN) .The data collected by direct interview with the mothers after taken verbal consent. The privacy of the patients identities was preserved.

Regarding the weight, infant electronic scale was used to measure their weight (grams),gestational age was calculated the based on the LMP (last menstrual period) provided by mothers.

Inclusion And Exclusion Criteria

All newly delivered live infant (preterm and full term) were included in the study, dead infants were excluded in the study.

Type of CHD

Echocardiography was done by specialist senior to identify the presence and types of congenital heart disease, all were also classified into cyanotic, a cyanotic according to the history. If there is more than one type of heart defect ,it was considered as complex congenital heart disease. SPSS version 16 was used for statistical analysis.

Statistical analysis

Data were statistically analyzed using SPSS (Statistical Package for Social Science) version 16, chi square was calculated, p value was significant if less than (0.005).

Results

Total number of births was 1616,60(3.71%)out of them were infants with congenital heart diseases of different types. Table (1) and (2) showed demographic of the criteria of male to female of the type of the study.And distribution of CHD to preterm and full term delivered baby.

Table(1): Demographic of the criteria of male to female of the type of the study.

	Pre term no.(%)	Term no. (%)	Total no. (%)	p value
Gender				
Male	23 (62)	14 (38)	37 (100)	0.811
Female	15 (65.2)	8 (34.8)	23 (100)	
Total	38 (63.3)	22 (36.7)	60 (100)	

Table(2):Distribution of CHD to preterm and full term delivered baby.

Maturity	With CHD no. (%)	Without CHD no. (%)	Total no. (%)	p value
Pre term	38 (8)	439 (92)	477 (100)	0.000
Full term	22 (1.9)	1113 (98.1)	1135 (100)	
Total	60 (3.7)	1552 (96.3)	1612 (100)	

*CHD: Congenital heart disease.

Table(3):Types of CHD in the study.

CHD	Neonate with CHD			P value
	Preterm no. (%)	Term no.(%)	Total no.(%)	
VSD	7 (70)	3 (30)	10 (100)	0.206
ASD	8 (62)	5 (38)	13 (100)	0.405
PDA	10 (50)	10 (50)	20 (100)	-
TGA	4 (100)	0 (0)	4 (100)	-
TOF	2 (67)	1 (33)	3 (100)	0.564
Complex CHD	7 (70)	3 (30)	10 (100)	0.206
Total	38 (63)	22 (37)	60 (100)	

*CHD:Congenital heart disease , VSD:ventricular septal defect, ASD:Atrial Septal Defect, PDA:Patent Ductus Arteriosus, TOF:Tetralogy of Fallot, TGA:Transposition of Great Arteries

CHD who are detected in the study were different type ,13% of the cases were cyanotic heart disease and 87% were acyanotic,Regarding for other systemic anomalies in the study 11.7% of them had other anomalies, only 2 (3.4%) of the cases had genetic analysis for other anomalies.

Table(4):Maternal criteria with CHD and Maturity.

Criteria	Neonate with CHD				
	Maturity	NVD no. (%)	C/S no. (%)	Total no. (%)	p value
Mode of delivery	Preterm	4(11)	34(89)	38(100)	0.718
	full Term	3(14)	19(86)	22(100)	
Birth weight in grams	Maturity	≤2500 no. (%)	>2500 no. (%)	Total no. (%)	0.036
	Preterm	37(97)	1(3)	38(100)	
Gravidity	full Term	18(82)	4(18)	22(100)	0.072
	Maturity	Primigravida no. (%)	Multigravida no. (%)	Total no. (%)	
	Preterm	11(29)	27(71)	38(100)	
	full Term	2(9)	20(91)	22(100)	

*NVD: normal vaginal delivery

*C/S: Caesarean section

*CHD:Congenital heart disease

Table(5): Maternal age relation to the incidence of CHD.

Neonates with CHD	Maternal age				p value
	20-30 yr no.(%)	>30-40 yr no.(%)	>40 yr no.(%)	Total no. (%)	
Preterm	20(53)	16(42)	2(5)	38(100)	0.490
full Term	15(68)	6)(27)	1(5)	22(100)	

*CHD: Congenital heart disease.

none of the mothers were smokers, none of them had CHD, 13% of them had coexistent systemic disease (Dm, Hypertension).

Discussion

Up to our knowledge this is study to investigate the incidence of CHD in Preterm infants. Importantly, the combination of prematurity and CHD results in a further increased risk of mortality and significant morbidity. We found that the incidence of CHD among the preterm infants were 7.9% which is similar to the findings of Chu et al [17] and Mustafa et al [18].

Regarding the association between maternal age and the prevalence of CHD in Diyala. Based on our analysis, the findings suggest a that the total prevalence of CHD in preterms was more common among mothers 20-30 years of age compared to the reference category. This finding disagree with previous studies conducted in USA, Hawaii and Saudi arabia , which reported an increased risk of CHD associated with advanced maternal age (35–44 years of age) [19,20,21]. We found no association between the advanced maternal age (>35) and the risk of CHD and this is consistent with findings of Best et al [22]. This may be due to the age of birth; which is about 20-30 years maternal age as apart common product age in our country.

On other hand, Several maternal co-morbidities such as smoking, and diabetes, who are less in this study, could partly explain or modify the association between advanced maternal age and CHD subtypes. For example, the Baltimore-Washington infant study reported that women with advanced maternal age who smoked >1 pack of cigarettes per day, were more likely to have a child with CHD compared to nonsmoking younger mothers [23].

The main limitations to our study were the size of the sample which can not be compared to the actual number of preterm with CHD in Iraq, and the lack of genetic analysis to determine the actual cause of the CHD.

Conclusion

The incidence of congenital heart disease was higher in Preterm delivered than full term babies. Mostly in the group ASD and complex heart defects.

Recommendation

We suggest that (1)conducting more studies searching for this association between congenital heart disease and premature delivery because of CHD may be stimulating factor for premature delivery due to hypoxia or other pathophysiology

(2) Recommend for doing echocardiography as a part of screening tests before preterm delivery to arrange for management.

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الخلاصة:

الخلفية: الأطفال المولودون قبل الأوان معرضون لخطر حدوث العديد من المضاعفات ، بعضها يهدد حياتهم. قد تتطور هذه المضاعفات بسبب الولادة المبكرة وترتبط ببعضها البعض.

الهدف: البحث عن حالات الإصابة بأمراض القلب الخلقية المرتبطة بالولادة المبكرة .

المريض والطريقة: الدراسة عبارة عن دراسة مقطعية على الأطفال الخدج الذين يولدون في مستشفى البتول التعليمي في يوليو ٢٠٢٢ إلى يناير ٢٠٢٣. تم استخدام استبيان معد ذاتياً لهذا الغرض. تم حساب عمر الحمل على أساس آخر دورة شهرية قدمتها الأمهات. تم إجراء تخطيط صدى القلب من قبل أخصائي كبير لتحديد وجود وأنواع أمراض القلب الخلقية ، كما تم تصنيفها جميعاً إلى مزرق ، وغير مزرق وفقاً للتاريخ. إذا كان هناك أكثر من نوع واحد من عيوب القلب ، فقد تم اعتبارها من التحليل الإحصائي SPSS أمراض القلب الخلقية المعقدة. تم استخدام الإصدار ١٦ من.

النتيجة: بلغ إجمالي عدد المواليد ١٦١٦ ، ٦٠ منهم (٣,٧١٪) يعانون من أمراض القلب الخلقية بأنواعها المختلفة. في الأطفال الخدج ، كان المعدل ٨٪ والذي تم الكشف عنه في: القناة الشريانية السالكة (٢٦٪، ١٠=العدد) ، عيب الحاجز الأذيني (٢١٪، ٨=العدد) عيب الحاجز البطيني (١٨٪، ٧=العدد) ، مركب من أمراض القلب الخلقية (١٨٪، ٧=العدد) ، تبديل الشرايين الكبرى (١٠٪، ٤=العدد) ، رباعية فالوت (٥٪، ٢=العدد) بينما في الأطفال الناضجين معدل ١,٩٪ وكانت قيمة (٠,٠٠٠). ١٣٪ كانت من أمراض القلب المزرق و ٨٧٪ كانت غير مزرق. هنالك حالات شذوذ جهازية أخرى في عينة الأطفال الخدج في الدراسة حيث ١١.٧٪ فقط ٢ (٣,٤٪) من الحالات خضعن لتحليل الجيني. لم تكن أي من الأمهات مدخنات ، أو لديهن مرض قلبي خلقي ، لكن ١٣٪ منهن مصابات بأمراض جهازية متزامنة (السكري ، ارتفاع ضغط الدم).

الاستنتاج: كان معدل الإصابة بأمراض القلب الخلقية أعلى في الولادة المبكرة مقارنة بالأطفال الناضجين. في الغالب في مجموعة عيوب الحاجز الأذيني وعيوب القلب المعقدة.

الكلمات المفتاحية: أطفال الخدج، أمراض القلب الخلقية المبكرة ، الإصابة .

وزارة التعليم العالي

والبحث العلمي

جامعة ديالى

كلية الطب



حدوث أمراض القلب الخلقية في الأطفال الخدج

بحث مقدم الى مجلس كلية الطب جامعة ديالى ، كجزء من متطلبات نيل درجة البكالوريوس في
الطب والجراحة العامة .

تم بواسطة:

ميمونه عطاالله جسام

الإشراف :

الدكتور نجدت شكر محمود

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