Incidence of congenital heart diseases in children born at Eastern Regional Referral Hospital, Monggar

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ABSTRACT

Introduction: Congenital heart diseases are the commonest birth defects worldwide. While the true incidence of congenital heart diseases is known in many countries, it has not been studied in Bhutan. **Methods:** Neonates born at the Eastern Regional Referral Hospital, Monggar in the year 2010 were screened for congenital heart diseases at birth by echocardiography and clinical examination including pulse oximetry. **Results:** The majority of the study subjects were natives of eastern districts of Bhutan. The incidence of congenital heart diseases was found to be 68 per 1000 live births, with Atrial Septal Defect being the commonest lesion. **Conclusions:** The overall incidence of congenital heart disease is higher than what is reported in other countries although the incidence of serious lesions was similar to what is reported elsewhere.

Keywords: Birth defects; Congenital heart diseases.

INTRODUCTION

Congenital heart disease (CHD) is defined by Mitchell et al as 'a gross structural abnormality of the heart or intra thoracic great vessels that is actually or potentially of functional importance[1]. Globally, CHD is the most common birth defect and the most common cause of death from birth defects in infancy[2]. Knowledge of the epidemiology of CHD is important in allocating appropriate resources and planning effective prevention. The reported incidence of CHD varies between 4 and 10 per 1000 live births, increasing up to 50 per 1000 live births in various studies[1,3]. The incidence of CHD has been studied in developed countries for many years but not in Bhutan. The available data of our country indicate that CHD is the most common reason for out-country referral of pediatric patients[4]. No data is available on the actual incidence or prevalence of congenital heart diseases in Bhutan. This study was aimed at finding out the incidence of CHD in children born at the Eastern Regional Referral Hospital (ERRH), Monggar in the year 2010.

METHODS

Setting

This study was conducted at the Eastern Regional Referral Hospital (ERRH), Monggar which is a 150 bedded tertiary care referral hospital catering as a referral hospital for the entire eastern region. Functional since June 2008, it comprises of an 18 bedded Pediatric ward and 6 bedded Neonatal Intensive Care Unit (NICU). A separate maternity ward is functional with about 30-40 deliveries per month. A full time Pediatrician and Gynecologist are available in the hospital. All children born at the hospital are routinely examined and screened by the Pediatrician.

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Study Population

Neonates born at ERRH between 1st January 2010 and 31st December 2010 were included in the study.

Exclusion Criteria

Neonates born at other hospitals and referred to ERRH for any reason were excluded from the study. Lesions that were excluded from the study included Atrial Septal Defects (ASD) measuring less than 5 mm, Patent Foramen Ovale (PFO), arrhythmias without an associated structural heart lesion and cardiomyopathies. Ductus Arteriosus which was patent only in the first 14 days of life, was considered normal.

Study Design

This is a prospective, hospital based, single center study on neonates born at a Regional Referral Hospital.

Ethical Clearance

Ethical Clearance was obtained from the Research Ethics Board of Health, Ministry of Health prior to the commencement of the study. Informed written consent was taken from the mother/father/guardian after they were made to read and understand an information leaflet printed both in English and Dzongkha. The names of the subjects were delinked from the records at the end of the study period during data analysis.

Procedure

After obtaining an informed written consent, the neonates were subjected to a thorough clinical examination with a special focus on the cardiovascular system. This included the colour, pulse rate, peripheral pulses and cardiac auscultation. Pulse oximetry and basic echocardiography, both of which are non-invasive procedures, were performed. Phillips iE33 cardiac ultrasound system was used and all echocardiograms were performed by the first author, who is a pediatrician at the

hospital. All echocardiograms included two dimensional, colour flow and continuous wave Doppler studies. Standard subcostal, parasternal, apical and suprasternal views were used. The first echocardiogram was conducted before discharge from the maternity or neonatal unit and a second examination performed after two weeks of life if there was a doubt. This was to ensure that some of the normal findings of cardiovascular re-adjustments in the immediate newborn period were not interpreted as CHD.

RESULTS

A total of 500 babies were born at ERRH during the study period. Of these, 3 babies could not come for echocardiogram while 1 baby expired before the study could be performed. Parents of one of the babies denied consent for echocardiography. Therefore, total of 495 neonates made up the study sample. The district of origin and the type of congenital heart lesions are shown in (Tables 1 and 2).

Table 1. Demographic characteristics of the study population

District of origin	Subjects *n* (%)
Monggar	237 (47.80)
Lhuntse	82 (16.60)
Trashigang	49 (9.90)
Trashiyangtse	36 (7.30)
Pemagatshel	24 (4.80)
Samdrupjongkhar	18 (3.70)
Other Districts	49 (9.90)
Total	**495 (100)**

Table 2. Types of Congenital Heart Lesions detected

Type of Lesion	*n* (%)
Atrial Septal Defect	15 (44)
Ventricular Septal Defect	12 (35)
Pulmonary Stenosis	3 (9)
Patent DuctusArteriosus	1 (3)
Transposition of Great Vessels	1 (3)
Mixed Lesions	2 (6)
Total	**34 (100)**

Most (90%) of the study subjects were natives of the eastern districts of Bhutan and approximately 10% hailed from other parts of the country. Majority of the subjects were native residents of Monggar district where the referral hospital is located. Therefore, the sample is more representative of the population of eastern Bhutan.

Although PFO was the most common echocardiographic finding-seen in 40 % of this study sample, it is not a true congenital heart lesion and was regarded as a normal finding in this study. Excluding the PFOs, 34 out of the 495 babies were detected to have a congenital heart defect.This gives an incidence of 68 per 1000 live births.Amongst the true cardiac lesions, ASD was the most common (*n*=15, 44%), followed by Ventricular Septal Defects (*n*=12, 35%). Mixed lesions were seen in two babies while only one baby was detected to have a cyanotic heart lesion (Transposition of great arteries).

DISCUSSION

This is the first study of its kind in the country. CHD is believed to be the most common birth defect and the most common reason for out-country referral from Bhutan in the pediatric age group[4]. This study revealed a high incidence of CHD with an overall incidence of 68 per 1000 live births. This is far too high when compared to the reported incidences of 4 to 50 per 1000 livebirths in other studies elsewhere in the world. This is most likely because many of the tiny Ventricular Septal Defects and Atrial Septal Defects that would close spontaneously during infancy have also been included in this study. However, it is noted in many studies that the incidence of CHDs in higher altitudes is higher than those at sea level[5,6]. The authors speculate that Bhutan being a mountainous country, the incidence of congenital heart diseases would be higher than reported elsewhere.

Alcohol intake during pregnancy is a recognized risk factor for CHDs[7]. Many women in our country consume alcohol during pregnancy, there by unknowingly risking their babies to be born with CHDs. Although this study did not attempt to study the relation between alcohol and CHDs, or the quantity and type of alcohol consumed, it was found that 13 percent of the mothers had consumed alcohol at some time during their pregnancy. Alcohol intake during pregnancy could also be one of the reasons for a higher incidence of heart defects in our population. However, this needs to be confirmed and substantiated with more research studies. In addition, the findings in this study may be slightly skewed as the study was conducted in a referral hospital which obviously would have delivered many mothers with other risk factors like diabetes and high risk pregnancies.

While most literature cites Ventricular Septal Defects as the most common CHDs, Atrial Septal Defects were the most common lesions in our study. In high altitudes, Atrial Septal Defects and Patent Ductus Arteriosus are found more commonly than other lesions[8]. Although the overall incidence was found to be higher, the incidence of serious lesions (2 per 1000 livebirths) was similar to what is reported elsewhere.

Since this is a single center study comprising mainly the native population of the eastern districts of Bhutan, it may not be a representative study for the country. Similar studies in other regional hospitals of Bhutan may be helpful to find out the actual incidence of cardiac defects at birth.

CONCLUSIONS

The overall incidence of congenital heart diseases in this study is high at 68 per 1000 live births, with Atrial Septal Defects being the commonest cardiac defect followed by Ventricular Septal Defects. Serious or cyanotic lesions were uncommon in this study.

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AUTHORS CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

PB: Concept, design, literature search, data collection and analysis, manuscript writing and review.

KW: Data collection and review

Author agree to be accountable for all respects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

None

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