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## Spectrum of the congenital heart diseases in term neonates

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### Abstract

**Introduction:** Congenital heart disease (CHD) is the most common congenital disorder, accounting for 28% of all congenital birth defects. In India, the prevalence of congenital heart disease is estimated to be around 9-12 per 1000 newborns. Early recognition of CHD is necessary for correct management and decision making and for referral.

**Objective:** The goal of this study is to determine the incidence and spectrum of congenital heart disease in term neonates in babies born in a tertiary care centre.

**Methods:** A cross sectional observation study conducted in department of paediatrics at sapthagiri institute of medical sciences and research centre, Bangalore from January to December 2023 to estimate the spectrum of CHD in neonates.

**Results:** 178 normal term neonates were enrolled in the study. Acyanotic congenital heart disease were seen in 28 neonates with no cyanotic heart disease. Among them 14 neonates had ASD (8%), 14 had VSD (8%), 8 had PDA (4.63%). No obvious congenital anomalies/syndrome were present in neonates.

**Keywords:** Ventricular septal defect, atrial septal defect, patent ductus arteriosus

### Introduction

Congenital heart disease comprises of a group of cardiac anatomic and functional abnormalities which are present at the time of birth. CHD is considered to be the most common birth defects <sup>[1]</sup>.

The prevalence of CHD has shown a significant rise being identified as 0.6/1000 live births in 1930 to 1934 to 9.1/ 1000 live births in 1995 <sup>[2]</sup>.

A systematic review and meta-analysis report showed the incidence in Asia about 9.3/1,000 live birth. <sup>[1]</sup>

The burden of CHD in India is likely to be enormous, because of a very high birth rate. It is estimated that over 180,000 children in India are born with CHD every year <sup>[4]</sup>.

The spectrum of diseases ranges from simple defects to severe malformations which is to be identified early and treated to reduce mortality.

Broadly the congenital heart disease can be classified into cyanotic and acyanotic congenital heart disease. Cyanotic heart diseases includes manifold like Transposition of great arteries (TGA), Fallot tetralogy, total anomalous pulmonary venous return(TAPVC), hypoplastic left heart syndrome(HLH), truncus arteriosus and tricuspid atresia where as acyanotic heart disease includes ventricular septal defect, patent ductus arteriosus, atrial septal defects and atrioventricular canal defects.

The aetiology of congenital heart disease is multifactorial and recurrences in families suggests a genetic basis <sup>[5]</sup>. The most common CHD is reported to be ventricular septal defect across the world <sup>[6, 7]</sup>.

The pattern of CHD will vary depending of various etiological factors which includes genetic background, geographic location, seasonal influence, maternal age and presence of CHD in the family.

Our study was conducted to assess the spectrum of congenital heart disease among the infants and to determine the prevalence of CHD in term infants so that appropriate interventions are to be planned on time.

**Objectives:** To assess the spectrum of congenital heart disease in normal term neonates.

#### Sample size

- **Study design:** Cross sectional observation study.
- **Place of study:** Sathagiri Institute of Medical Sciences And Research Centre.
- **Study period:** 1 year (January - December 2023).
- **Sample size:** 178 neonates.

#### Inclusion criteria

All term neonates born over a period of 1 year

#### Exclusion criteria

- Babies born <37 weeks of gestation
- Babies who required NICU admission

#### Materials and Methods

- The study was conducted in the department of Pediatrics at Sathagiri Institute of Medical Sciences and Research Centre, Bangalore from January 2023 to December 2023.
- All full term neonates born over a period of 1 year willing for screening echocardiography were included in the study. Patient details were obtained and characteristics like age, gender, birth weight, maternal comorbidities like hypertension and diabetes were collected. Any neonate born prematurely or requiring

NICU admission were excluded from the study.

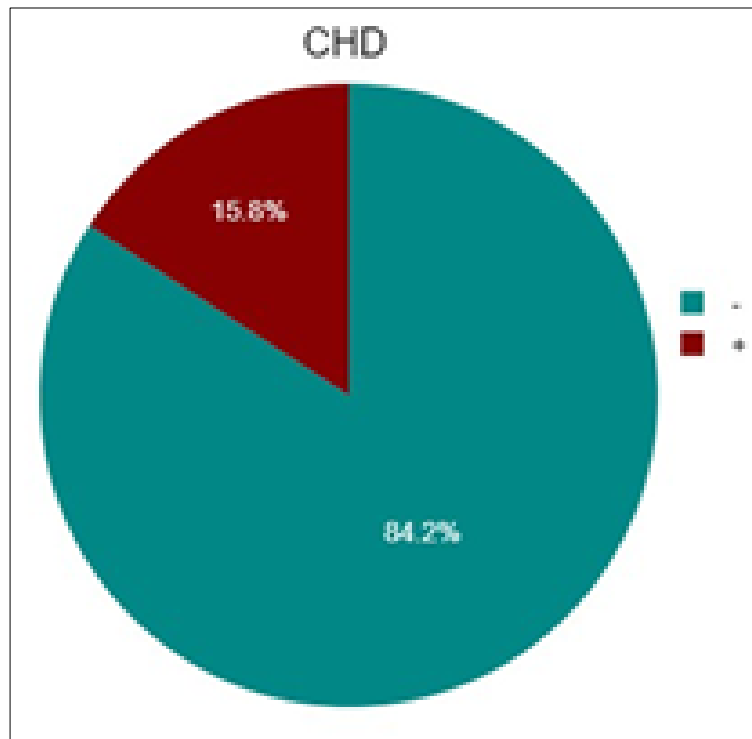
- Echocardiographic evaluation was performed in term neonates using a Philips HD7XE system.

#### Statistical analysis

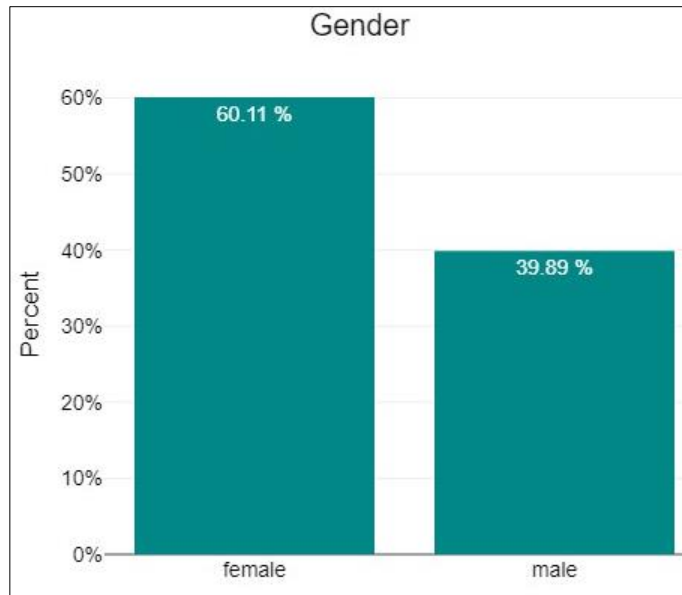
All collected data were tabulated. Descriptive statistics were applied to analyze the gathered information. Categorical variables were described using frequency and percentage, while continuous variables were summarized using the median and standard deviation. The relative risk, along with its 95% confidence interval, was calculated to determine the strength of this association. Analysis was performed using IBM SPSS Statistics version 20.0.

#### Results

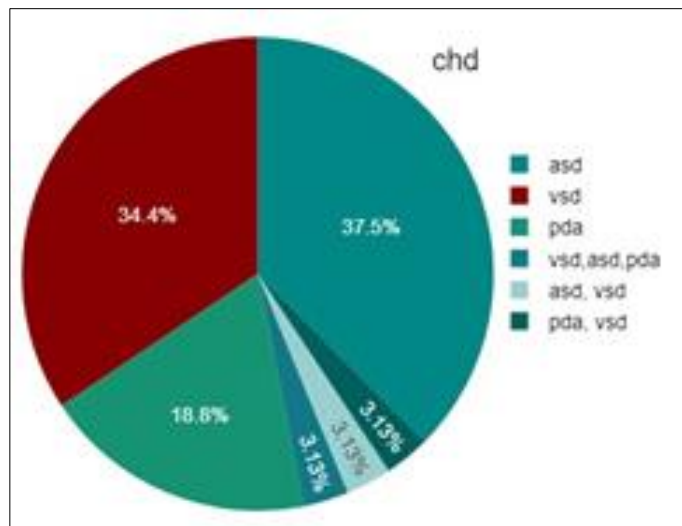
A total of 178 neonates were included in the study. Of these 149 (84.18%) neonates were normal with no congenital heart defect and 28 (15.82%) had congenital heart defects. (fig 1). Of these 107(60%) were females and 71 (40%) were males (fig 2). Mean weight of the neonates in our study were  $2.91 \pm 0.42$ . Of the CHDs the commonest cardiac lesion was ASD present in 14 (8%) neonates (fig 4) followed by VSD in 14 (8%) patients. Of which 5 (2.86%) had perimembranous VSD, 7 (4%) had muscular VSD and 2 (1.14%) had apical VSD (fig 5), PDA in 8 (4.63%) patients (fig 6). No cyanotic congenital heart disease were noted in our study. Females (12.5%) had more prevalence of congenital heart disease compared to males (5.6%) (Fig. 7).



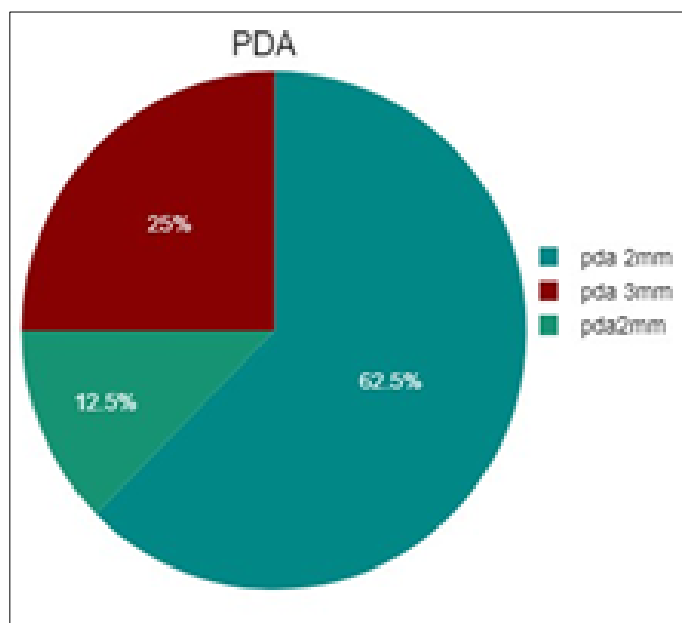
**Fig 1:** Congenital heart defects in term neonates. Out of 178 neonates, 149 (84.18%) were normal, while 28 (15.82%) had congenital heart defects



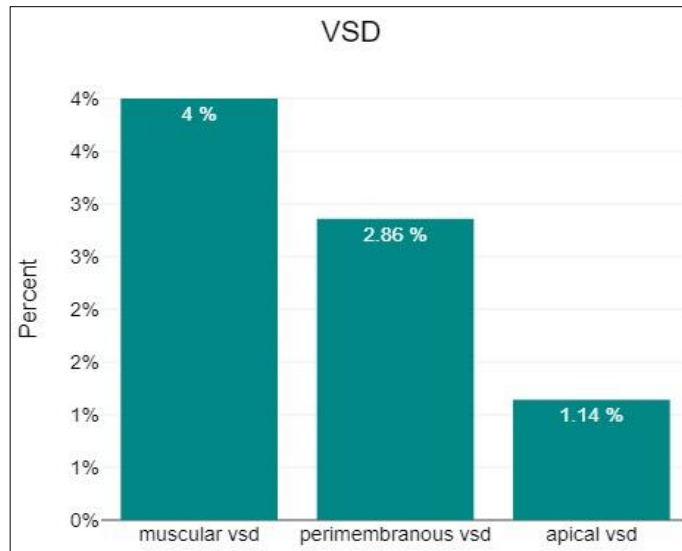
**Fig 2:** Gender distribution of term neonates. Among the 178 neonates, 107 (60%) were females and 71 (40%) were males



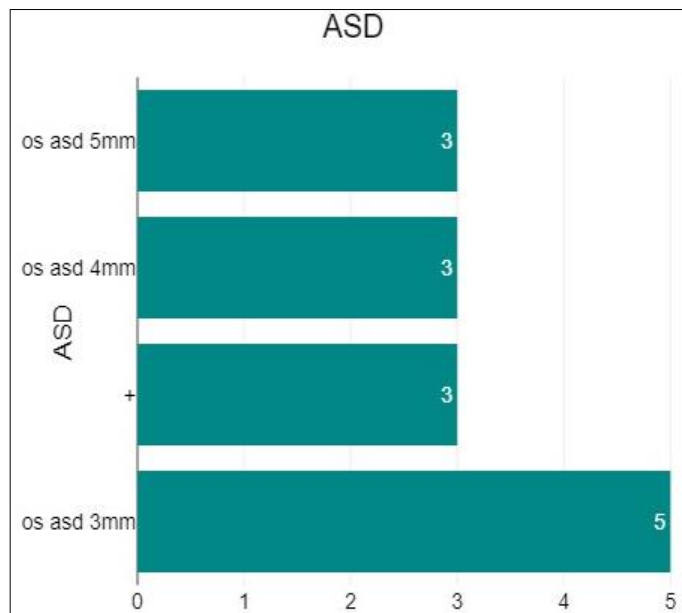
**Fig 3:** Birth weight distribution of the neonates. The mean weight of the neonates was  $2.91 \pm 0.42$  kg



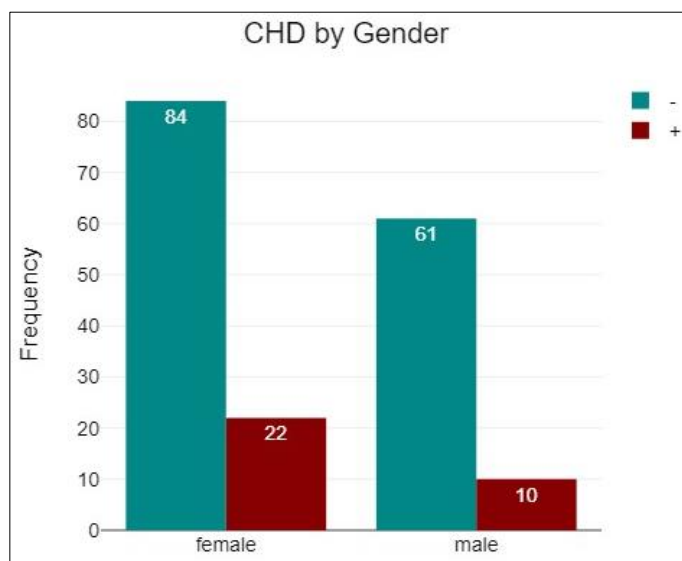
**Fig 4:** Incidence of atrial septal defect (ASD) in neonates. ASD was present in 14 (8%) neonates



**Fig 5:** Incidence of ventricular septal defect (VSD) in neonates. VSD was present in 14 (8%) patients, with 5 (2.86%) having perimembranous VSD, 7 (4%) having muscular VSD, and 2 (1.14%) having apical VSD



**Fig 6:** Incidence of patent ductus arteriosus (PDA) in neonates. PDA was present in 8 (4.63%) patients



**Fig 7:** Comparison of the prevalence of congenital heart disease in female and male neonates. Females had a higher prevalence (12.5%) compared to males (5.6%)

**Table 1:** Diagnosis of the patients

Diagnosis	No. of patients	Frequency
Atrial septal defect	12	21.3%
Ventricular septal defect	11	19.5%
Patent ductus arteriosus	6	10.6%
ASD, VSD	1	1.78%
ASD, VSD, PDA	1	1.78%
VSD, PDA	1	1.78%

**Table 2:** Gender wise distribution of disease

Diagnosis	Gender distribution		Total
	Males	Females	
Atrial septal defect	4 (28.7%)	10 (71.3%)	14 (100%)
Ventricular septal defect	4 (28.5%)	10 (71.7%)	14 (100%)
Patent ductus arteriosus	3 (37.5%)	5 (62.5%)	8 (100%)

### Discussion

CHD being the most important cause of significant mortality and morbidity in the neonatal period and represents the globe burden of health. Early screening and diagnosis of CHD is crucial step in diagnosing the underlying CHD.

In our study a total of 178 neonates were enrolled in this study. Of 178 neonates, 28 had acyanotic congenital heart disease whereas none had cyanotic congenital heart disease.

In our study among the acyanotic CHDs, ASD, VSD and PDA were more common in females 22 (68%) and males being 10(25%). In similar study done by Wu Mh *et al.*, on prevalence of congenital heart disease at live birth birth in taiwan where VSD, ASD, PDA were common in females than males<sup>[8]</sup>.

Ventricular septal defect and atrial septal defects were the commonest congenital cardiac lesion in our study. This is comparable to other study done by Burki *et al.* on prevalence and pattern of congenital heart disease in hazara where VSD was reported to be the most common esion accounting for 61.4%<sup>[9]</sup>.

Another study done by Islam *et al.* on the prevalence of congenital heart disease in neonate in a tertiary hospital showed most common CHD to be VSD followed by ASD, PDA and other cyanotic heart defects<sup>[10]</sup>.

In our study, cardiac defects were not associated with any congenital anomalies or syndromes among the neonates.

### Conclusion

Congenital heart disease is associated with increased risk of morbidity and mortality. Early recognition of such anomalies is required for early intervention of the condition.

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