



## Prevalence of Suspected Congenital Cardiac Disease Using Pulse Oxymeter: A Descriptive Observational Study from Maharashtra.

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### KEYWORDS

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### ABSTRACT:

**Background:** Pulse oximetry has been proposed as screening method for the detection of congenital heart defects. It is a simple, non-invasive investigation which measures the percentage of haemoglobin in blood that is saturated with oxygen. It is proposed that the measurement of oxygen saturation identifies infants with mild cyanosis who do not have an audible murmur or other signs of cardiac abnormality and are not detected by routine clinical examination.

**Objectives:** To find out the prevalence of suspected congenital cardiac disease using pulse oxymeter.

**Methodology:** Present descriptive observational study was carried out at Department of paediatrics at tertiary care centre including newborns born at our hospital.

**Results:** We included total 100 new-borns in our study fulfilling the eligibility criteria. Majority of them were 49-72 hours of age i.e. 85%. Majority of the babies in our study were males i.e. 61%. Remaining were females i.e., 39%. We carried out screening of all new-borns as mentioned in methodology using pulse oximeter. It revealed fail test in 4 new-borns. So, the prevalence of CHD in our study by using pulse oximetry as screening tool was 4%.

**Conclusion:** Prevalence of CHD in our study by using pulse oximetry as screening tool was 4%. Pulse oximetry is a safe, non-invasive, inexpensive, excellent detection rate and reasonably sensitive test that will detect many cases of CCHD.

### Introduction

Congenital heart disease (CHD) is the most common congenital disorder in newborns.<sup>1,2,3</sup> Critical CHD, defined as requiring surgery or catheter-based intervention in the first year of life, occurs in approximately 25 percent of infants with CHD.<sup>4</sup> Although many newborns with critical CHD are symptomatic and identified soon after birth, others are not diagnosed until after discharge from the birth hospitalization.<sup>5</sup> In infants with critical cardiac lesions, the risk of morbidity and mortality increases when there

is a delay in diagnosis and timely referral to a tertiary center with expertise in treating these patients.<sup>6,7</sup>

One of the major contributors to increased infant mortality and morbidity is clinical deterioration and collapse prior to diagnosis and treatment.<sup>8</sup> Early detection of congenital heart disease in the asymptomatic period immediately after birth will reduce clinical deterioration by instigation of appropriate, timely management.<sup>9</sup>

Pulse oximetry has been proposed as screening method for the detection of congenital heart defects. It is a simple, non-invasive investigation which measures the



percentage of haemoglobin in blood that is saturated with oxygen. It is proposed that the measurement of oxygen saturation identifies infants with mild cyanosis who do not have an audible murmur or other signs of cardiac abnormality and are not detected by routine clinical examination.<sup>10</sup>

The existing pulse oximetry monitoring protocol to detect critical congenital heart disease, is restricted to neonates 24 to 48 hours of age in well infant nursery.<sup>11</sup> A simple algorithm for units catering to sick newborns is challenging because of heterogeneity of underlying conditions; need of studies across a broad range of newborn delivery systems has been expressed. Pulse oximetry as a screening test for congenital cyanotic heart disease has been evaluated among well neonates but not in sick neonates.

Hence the present study was carried out with the objective to screen the newborns and to find the prevalence of CHD.

**Objectives:** To find out the prevalence of suspected congenital cardiac disease using pulse oximeter

#### Materials and Methods

**Study setting:** Department of paediatrics at tertiary care centre

**Study population:** All the newborns born at our hospital were included after the predetermined inclusion criteria are fulfilled.

**Study period:**

**Study design:** Descriptive observational study

**Sampling technique:** Simple Random sampling method

#### Inclusion criteria

- All the normal live newborns with gestation >35 weeks born
- APGAR Score 8 and 9 at 1 and 5 seconds of life respectively.
- Babies with central cyanosis.

#### Exclusion criteria

- Sick neonates (Neonates with signs of sepsis, respiratory distress, congenital malformations of lungs)
- Infants who required resuscitation at birth

- Infants who have aneuploidy on antenatal scan
- Parent who doesn't give consent for the study
- Infants who are prenatally diagnosed as having congenital cardiac disease

Methods of data collection:

All the normal newborns born in the hospital was screened for pulse oximetry once preferably after 24 hours to 72 hours of life. All the inclusion and exclusion criteria was applied before inclusion of the newborns in the study. Screening was performed by measuring oxygen saturations in the right hand (pre ductal saturation) and one foot (post ductal saturation) either concurrently or one immediately after the other. Right foot was taken for the sake of uniformity. An oxygen saturation of more than 95% in the right hand or foot and  $\leq 3\%$  difference between right hand and foot was considered negative or pass test and will require no further evaluations before discharge. A screen was considered positive or a fail if measurement of oxygen saturation is below 90%, below 95% in both extremities after three measurements (one hour apart), or if there is a difference of more than 3% in oxygen saturation between pre ductal and post ductal saturations after three measurements. Infants with a failed screening will undergo diagnostic two-dimensional echocardiogram and evaluation by paediatric cardiologist.

#### Results

**Table 1: Distribution according to age group**

		Frequency	Percent
Age group	24-48 hours	15	15.0
	49-72 hours	85	85.0
	Total	100	100.0

We included total 100 new-borns in our study fulfilling the eligibility criteria. Majority of them were 49-72 hours of age i.e. 85% and remaining 15% were from 24-48 hours age group.

**Table 2: Distribution according to gender**

		Frequency	Percent
Gender	Female	39	39.0
	Male	61	61.0
	Total	100	100.0

Majority of the babies in our study were males i.e. 61%. Remaining were females i.e., 39%.

**Table 3: Distribution according to family history of CHD**

		Frequency	Percent
Family H/o CHD	Present	4	4.0
	Absent	96	96.0
	Total	100	100.0

Family history of CHD was seen in 4 cases. So, the prevalence family history of CHD in our study was 4%.

**Table 4: Distribution according to family history of CHD**

		Frequency	Percent
Consanguinity	3 Degree	8	8.0
	Non consanguineous	92	92.0
	Total	100	100.0

Out of 100 new-borns majority i.e.92% were the product of non-consanguineous marriages. Rest was the product of third-degree relation i.e. 8%.

**Table 5: Prevalence of CHD according to screening test (Pulse oximeter)**

		Frequency	Percent
Pulse oximetry results	Fail	4	4.0
	Pass	96	96.0
	Total	100	100.0

We carried out screening of all new-borns as mentioned in methodology using pulse oximeter. It revealed fail test in 4 new-borns. So, the prevalence of CHD in our study by using pulse oximetry as screening tool was 4%.

### Discussion

We included total 100 new-borns in our study fulfilling the eligibility criteria. Majority of them were 49-72 hours of age i.e. 85% and remaining 15% were from 24-48 hours age group. Majority of the babies in our study were males i.e. 61%. Remaining were females i.e., 39%. **(Table 1 and 2)**

Family history of CHD was seen in 4 cases. So, the prevalence family history of CHD in our study was 4%. **(Table 3)**

Out of 100 new-borns majority i.e.92% were the product of non-consanguineous marriages. Rest was the product of third-degree relation i.e. 8%. **(Table 4)**

We carried out screening of all new-borns as mentioned in methodology using pulse oximeter. It revealed fail test in 4 new-borns. So, the prevalence of CHD in our study by using pulse oximetry as screening tool was 4%. **(Table 5)**

**Gopalakrishnan S. et al<sup>11</sup>** reported the prevalence of CHD in their study was 3.63% which is similar to our study findings. Findings of our study are similar to many of the previous studies from India.<sup>12,13,14</sup>

**Gómez-Rodríguez G et al<sup>15</sup>** evaluated pulse oximetry as a screening test for critical congenital heart disease (CCHD) in term newborns. The overall prevalence of CHD was 11.5 per 1000 live births, and the prevalence of CCHD was 3.9 per 1000 live births.

Pulse oximetry is a safe, non-invasive, inexpensive, excellent detection rate and reasonably sensitive test that will detect many cases of CCHD. Earlier diagnosis of CCHD may lead to earlier interventions and improved patient outcomes.<sup>16</sup>

**Conclusion:** Prevalence of CHD in our study by using pulse oximetry as screening tool was 4%. Pulse oximetry is a safe, non-invasive, inexpensive, excellent detection rate and reasonably sensitive test that will detect many cases of CCHD.



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