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Clinical Parameters of New Born Subjected for Detection of Critical Congenital Heart Disease at a Tertiary Care Hospital

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Abstract
In the high infant mortality rate (IMR) areas, most of the neonatal deaths are attributed to preventable causes like pneumonia and birth asphyxia. However, once the IMR values start declining due to improvement in these factors the proportion of childhood deaths due to congenital malformations like CCHD becomes more important. Neonates included in the study were asymptomatic neonates (term and late preterm) delivered in the tertiary care hospital. The study was commenced after obtaining clearance from the institutional ethical committee. Parents of all neonates were given written informed consent forms for this study and neonates of those who were unwilling were excluded from the study. All those neonates who had a diagnosis of duct dependent circulation on antenatal sonogram were also excluded. Mean birth weight of neonates was 2770±450grams with a maximum weight of 4260 grams and minmum of 900 grams. Mean length was 48.63±1.57 cm with a maximum length of 52cm and minimum of 44cm. Mean head circumference was 34.35 ± 0.67cm with a maximum of 36cm and minimum of 33cm.

INTRODUCTION

Non-cardiac disorders commonly identified by low oxygen saturation in the newborn period include congenital pneumonia and septicaemia, pulmonary hypertension of the neonate, me conium aspiration syndrome, and pneumothorax.

These disorders can be as life-threatening as CCHD and so their early recognition and treatment after pulse oximetry screening is an additional benefit of the procedure[1].

In the high infant mortality rate (IMR) areas, most of the neonatal deaths are attributed to preventable causes like pneumonia and birth asphyxia.

However, once the IMR values start declining due to improvement in these factors the proportion of childhood deaths due to congenital malformations like CCHD becomes more important[2].

A prospective study on clinical utility of pulse oximetry for newborn CCHD screening was published from Kerala. The feasibility of performing neonatal heart surgeries with in-hospital mortality almost comparable to developed nations has also been already reported from Kerala.

Hence, the focus has to shift towards early detection of critical CHD, more efficient transport of neonates with a CCHD to a tertiary centre before clinical deterioration and reducing the pre-operative morbidity[3].

Early detection of hypoxemia by pulse oximetry screening will also allow judicious allocation of scarce resources towards the management of infectious and respiratory disorders that substantially contribute to neonatal mortality and morbidity[4].

MATERIALS AND METHODS

- This was a hospital based prospective observational study carried at S. Nijalingappa Medical College, Bagalkot. All neonates fulfilling selection criteria, born and admitted in postnatal ward during study period were included in the study.
- In Asymptomatic new born measurement of saturations using pulse oximeter on the Right hand and foot was carried out after 24hrs of birth. Saturations above 95% was regarded as having negative screen. Those with saturation below 90% were subjected to Echocardiography. Patients with saturations between 90 and 95% were subjected to a second pulse oximetry screen 6-12 hrs later. Screening was done after 24 hrs of birth.

Inclusion Criteria:

- All the asymptomatic newborn neonates (term and late preterm) delivered in the tertiary care hospital
- Parents who gave informed consent

Exclusion Criteria:

- Newborn with respiratory symptoms and signs Newborn with symptomatic cardiac diseases
- All neonates with prenatal sonographic diagnosis of duct dependent circulation

Data Collection: Neonates included in the study were asymptomatic neonates (term and late preterm) delivered in the tertiary care hospital. The study was commenced after obtaining clearance from the institutional ethical committee. Parents of all neonates were given written informed consent forms for this study and neonates of those who were unwilling were excluded from the study. All those neonates who had a diagnosis of duct dependent circulation on antenatal sonogram were also excluded.

Oxygen saturation was measured with Nelcor Probe, which was held manually in both upper and lower limbs after 24 hours after birth. It was ensured that the baby's limbs were warm and a consistent wave form was noticed before final readings were taken. Pulse oximetry of Gold way Philips company ut 600a, was used. Two readings at 10 min interval were taken, mean of both was used.

Parental concern was taken into consideration before and after Pulseoximetry screening/ECHO. Anxiousness regarding the individual procedures were taken care of and its relevance was also explained in detail to the parents. Following the procedures, their queries were answered in terms of their understanding. Those babies with an ECHO suggestive of CCHD were given more parental attention with regard to nature and prognosis of condition and they were also given awareness regarding the need of higher centre referral.

Parents of Neonates with negative screen were explained to report in case of any symptoms related to heart disease or any other symptoms like bluish discolouration, inability to feed, swelling of body.

RESULTS AND DISCUSSIONS

A total of 400 newborns were included in the study. 56.2% of neonates were males and 43.8% of neonates were females.

Term gestation newborns were more in the study compared to late preterm gestation.

Among the birth weight distribution of the newborns in the study, those newborns in the weight range of 2501-3000 grams were maximum [n=180 (45%)]. The least number of newborns was for the weight range 0-1500 grams [n=1 (0.2%)].

Mean birth weight for the newborns of this study was 2.77±0.45kg.

Mean birth weight of neonates was 2770±450grams with a maximum weight of 4260 grams and minimum of 900 grams.

Mean length was 48.63±1.57 cm with a maximum length of 52cm and minimum of 44cm.

Mean head circumference was 34.35±0.67cm with a maximum of 36cm and minimum of 33cm.

Mean heart rate of newborn was 138±2 beats per minute. Mean respiratory rate of newborn was 39±2 cycles per minute.

Prenatal Screening: Studies suggest that 30 to 60% of congenital heart defects can be detected prenatally by four-chamber screening. High-resolution four-chamber transvaginal echocardiography can provide detailed imaging of the cardiac anatomy in the fetus and can detect major abnormalities, although routine prenatal screening for CHD remains controversial[5].

In one study, however, relying on only a four-chamber view would have resulted in overlooking 23% of the defects. Detailed fetal echocardiography with outflow tract views can be particularly helpful in detecting anomalies of the great arteries and is indicated in pregnancies in which the risk of CHD is increased[6].

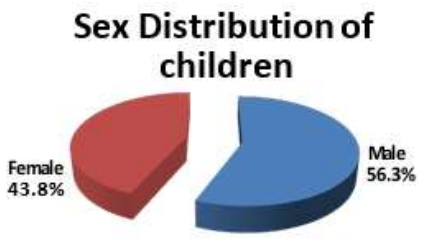

Fig 1a: Sex Distribution of the children

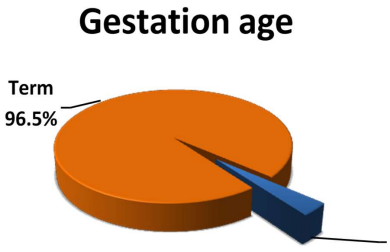

Fig 1b: Distribution of neonates according to Gestation Age

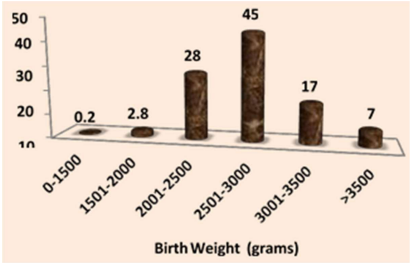

Fig 1c: Distribution of neonates according to Birth Weight (gm)

Table 1: Distribution of neonates according to sex, gestational age and birth weight

Characteristics	Frequency (n)	Percentage
Sex		
Male	225	56.2
Female	175	43.8
Gestation Age		
Late Preterm	14	3.5
Term	386	96.5
Birth Weight (gm)		
0-1500	1	0.2
1501-2000	11	2.8
2001-2500	112	28
2501-3000	180	45
3001-3500	68	17
>3500	28	7
Total	400	100

Mean birth weight: 2.77 ± 0.45 Kg

Table 2: Mean and SD of anthropometric parameters, heart rate, respiratory rate of study population

Characteristics	Minimum	Maximum	Mean	SD
Birth weight (gm)	900	4260	2770	450
Length (cm)	44	52	48.63	1.57
Head circumference (cm)	33	36	34.35	0.67
HR (beats per minute)	130	144	137.51	2.44
RR (cycles per minute)	32	46	38.58	1.87

Electrocardiogram: An electrocardiogram (ECG) is indicated if CHD or an arrhythmia is suspected. However if the index of suspicion is high on the basis of other findings, a normal ECG does not exclude the presence of CHD.

Chest Radiographs: Chest radiographs of an infant with congestive heart failure demonstrates cardiomegaly and increased or decreased pulmonary vascular markings. However it may not be conclusive during first few days of life[7].

Echocardiography: As all above modalities of diagnosis are inconclusive, definitive evaluation requires cardiac imaging by Echocardiography and it remains the primary diagnostic modality. Echocardiography is both sensitive as well as specific tool to diagnose CHD and CCHD but it requires costly equipment and skilled and trained personnel.

Cardiac Catheterization: When echocardiography fails to provide confident evaluation of CHD, then diagnostic cardiac catheterization is performed at specialized centres with known risk to confirm diagnosis and for decision over further management.

Screening by Pulse Oximetry: Though Echocardiography is the gold standard for diagnosis of CCHD and can be performed by neonatologist or paediatric cardiologist with acceptable accuracy, it is not feasible as a routine screening test in most of the settings. Simple, cost effective, feasible, bedside screening test is thus required[8].

CONCLUSION

Mean head circumference was 34.35±0.67cm with a maximum of 36cm and minimum of 33cm.

Mean heart rate of newborn was 138±2 beats per minute.

Mean respiratory rate of newborn was 39±2 cycles per minute.

REFERENCES

1. Hoke, T.R., P.K. Donohue, P.K. Bawa, R.D. Mitchell, A. Pathak, P.C. Rowe and B.J. Byrne, 2002. Oxygen saturation as a screening test for critical congenital heart disease: A preliminary study. Pediatr. Cardiol., 23: 403-409.
2. GRANELLI, A.D., M. MELLANDER, J. SUNNEGÅRDH, K.S. & and I. ÖSTMAN-SMITH, 2005. Screening for duct-dependent congenital heart disease with pulse oximetry: A critical evaluation of strategies to maximize sensitivity. Acta Paediatrica, 94: 1590-1596.
3. Cordero, I., 2014. Understanding and caring for a Schiotz tonometer. Comm. Eye Health, Vol. 27.
4. Ruangritnamchai, C., W. Bunjapamai and B. Pongpanich., 2007. Pulse oximetry screening for clinically unrecognized critical congenital heart disease in the newborns. Images paediatric cardiol. Vol. 1.
5. Buskens, E., D.E. Grobbee, I.M.E. Frohn-Mulder, P.A. Stewart, R.E. Juttmann, J.W. Wladimiroff and J. Hess, 1996. Efficacy of routine fetal ultrasound screening for congenital heart disease in normal pregnancy. Circulation, 94: 67-72.
6. Stoll, C., Y. Alembik and B. Dott., *et al.* 1998. Evaluation of prenatal diagnosis of congenital heart disease. Prenatal diagnosis. 8: 801-807.
7. Cuneo, B.F., L.F. Curran, N. Davis and H. Elrad, 2004. Trends in prenatal diagnosis of critical cardiac defects in an integrated obstetric and pediatric cardiac imaging center. J. Perinatology, 24: 674-678.
8. Laas, E., N. Lelong, A.C. Thieulin, L. Houyel and D. Bonnet *et al.,* 2012. Preterm birth and congenital heart defects: A population-based study. Pediatrics, 130: 829-837.