Pulse Oximetry with Clinical Assessment to Screen the Congenital Heart Disease in Asymptomatic Term Newborn at Mother and Newborn Hospital, Lao PDR

Kouyang Nhiacha[1], Mayfong Mayxay[2], Yuttapong Wongswadiwat[3]

1. Faculty of Medicine, University of Health Sciences, Vientiane Capital, Lao PDR
2. Administration office, University of Health Sciences, Vientiane Capital, Lao PDR
3. Faculty of Medicine, Khon kaen University, Thailand

Received 18 July 2022; received in revised form 20 November 2023; accepted for publication 25 November 2023

Abstract

Background: Congenital heart disease (CHD) is the major congenital anomalies, representing for one - third of all congenital anomalies and also leading cause of death in infants. Asia reported the highest CHD birth prevalence with 9.3 per 1,000 live births. Delayed diagnosis of congenital heart disease worsens preoperative condition and outcome of surgery in neonates, increased rates of cardiovascular compromise and end organ dysfunction the later CHD was recognized. Early detection of major congenital heart disease might improve the outcome of newborn babies

Objective: To determine the congenital heart disease (CHD) by pulse oximetry with clinical assessment screening in asymptomatic term neonates at Mother and Newborn Hospital in Vientiane Capital, Lao PDR.

Methodology: During the cross-sectional study, from July 1st, 2023 to August 30th, 2023 to investigate pulse oximetry with clinical assessment screening in newborn 24-72 hours of life at OPD nursery Unit, at Mother and Newborn Hospital in Vientiane Capital, Lao PDR from July 1st, 2023 to August 30th, 2023.

Results: A cross-sectional study involving 600 asymptomatic term newborn babies. The diagnosis congenital heart disease 11 of 600 cases (1.83%), 3 cases were critical congenital heart disease. Median age screening was 24 hours (ranged 24-72 hours) and the mean +/- SD was 31.80 +/- 11.18. Normal delivery was 80.5%. The median birth weight was 3000 grams (2100-4200). The gender was 50.3% female. Pulse oximetry with clinical assessment screening in positive was 1%, pulse oximetry alone was 0.5% and clinical assessment was 0.33%. Pulse oximetry with clinical assessment was detected 5 of 11 cases (45.45% sensitivity) of all congenital heart disease and 3 of 3 cases (100% sensitivity) of critical congenital heart disease, pulse oximetry alone was detected 3 of 11 cases (27.27% sensitivity) of all CHD and two of three cases (66.67% sensitivity) of critical CHD, clinical assessment alone was detected 2 of 11 cases (18.18% sensitivity) of all CHD and one of three cases (33.33% sensitivity) of critical CHD. The specificity of using pulse oximetry with clinical assessment was 99.83% for all CHD and 99.50% for critical CHD, pulse oximetry alone was 99.83% for both all CHD and critical CHD, and clinical assessment was 99.83% for all CHD and 99.50% for critical CHD.

Conclusion: Pulse oximetry with clinical assessment screening is more effective at early detection of critical congenital heart disease in asymptomatic term newborns. It has good sensitivity and specificity for both critical and non- congenital heart diseases, including challenging cases that required urgent intervention. These findings suggest that pulse oximetry with clinical assessment screening should be used routinely to screen all newborns for congenital heart disease.

Keywords: Congenital Heart Disease (CHD), Neonate, clinical assessment screening, pulse oximetry

*** Corresponding author:** Kouyang Nhiacha, Tel: +85620 7605 2504 Email: nhiacha.kouyang@gmail.com

Introduction

Congenital heart disease (CHD) is the major congenital anomalies, representing for one - third of all congenital anomalies and also leading cause of death in infants. Total prevalence of major congenital anomalies of 23.9 per 1,000 births, 80% was livebirths. 2.5% of livebirths with congenital anomaly died in the first week of life. 2.0% were stillbirths or fetal deaths from 20 weeks gestation. 17.6% of all cases were terminations of pregnancy due to fatal anomaly (TOPFA). Reported birth prevalence of CHD varies widely among studies worldwide. Asia reported the highest CHD birth prevalence, with 9.3 per 1,000 live births, with relatively more pulmonary outflow obstructions and fewer left ventricular outflow tract obstructions. Reported total CHD birth prevalence in Europe was significantly higher than in North America, with 8.2 per 1,000 live births compare with 6.9 per 1,000 live births [5].

Delayed diagnosis of congenital heart disease worsens preoperative condition and outcome of surgery in neonates, increased rates of cardiovascular compromise and end organ dysfunction the later CHD was recognized. Furthermore, for individual CHD types, there was a significant trend towards a higher rate of cardiovascular compromise with later CHD recognition for left heart obstruction (LHO), transposition of great arteries (TGA) and single ventricle (SV) lesions. Neonatal CHD is first recognized has an impact on preoperative condition, which in turn influences postoperative progress and survival after surgery. Optimal screening procedures and access to specialist care will improve outcome for neonates undergoing cardiac surgery [1]. Early detection of major congenital heart disease might improve the outcome of newborn babies; particularly for critical congenital heart disease such as ductal dependent lesions in which closure of the ductus arteriosus can result in acute cardiovascular collapse, acidosis, and death [1][2][4].

Congenital heart diseases screening relies on mid-trimester ultrasound to scan the fetal heart chambers and postnatal physical examination that includes assessment of pulses and heart sounds and inspection for cyanosis. These two screening methods have a low detection rate and a substantial number of babies are discharged from hospital before congenital heart defects are diagnosed; some of these babies die or present in such a poor clinical state that the outcome, despite treatment, is compromised. Routine neonatal examination fails to detect greater than 50% of infants with CHD. One in 10 infants with CHD who died in the first year did not have a diagnosis made of the malformation before death, and of those who died in the first week, 25% did not have the diagnosis identified before death. The average length of stay of asymptomatic newborns reduced to 48 hours, many of these infants will already be discharge to home at the time of onset of clinical signs of CHD [3][6].

Material and Methods

Study design

This study is a descriptive cross-sectional study with continuously data collection for 2 months among term newborn babies with asymptomatic aged 24-72 hours at Mother and Newborn Hospital.

Study site

Nursery unit, outpatient department, Mother and Newborn Hospital, Vientiane Capital, Lao PDR

Duration of study

Duration of study from 1st June to 30th July 2023

Study population

All asymptomatic term newborn babies aged 24-72 hours

- **Inclusion criteria**

All asymptomatic term newborn babies aged 24-72 hours with agree of consent form to join research project

- **Exclusion criteria**
  - All term newborn babies with symptomatic (tachypnea and/or cyanosis)
  - All preterm newborn babies
  - Prenatal diagnosed CHD
  - Lack of consent form to join research project

Sampling method

This research study has not sampled sample size due to we will do a pilot study in asymptomatic newborn at nursery unit in Mother and Newborn Hospital.

Tools and Material

- Questionnaires form
- Stethoscope (Spirit Deluxe Series)
- Oximeter (a new generation RAD-5v pulse oximeter (Masimo, Irvine, CA, USA) with a multisite reusable sensor (LNOP YI, Masimo)
- Echocardiogram machine (GE Vivid S60 and E9), (Samsung Accuvix V10), (TOSHIBA Viamo).
- Telephone call to the family of the patients for follow up the patients.

Data collection

- First, training of using pulse oximeter screening and clinical assessment for the team project at Mother and Newborn hospital.
- Second, we do the questionnaires form test and edit forms.
- Third, before screening we will explain to parents for benefit and harm of project then consent form will be done. For prenatal diagnosed CHD, symptomatic (tachypnea, central cyanosis) term newborn, preterm babies and lack of consent form will be excluded from the study.
- Then the information including of general information, family history, prenatal history, birth history we will interview the parents, look for the mother lock book and delivery document.

- Fourth, all asymptomatic term newborn at nursery unit or obstetric ward who delivery 24-72 hours of age will be screening with pulse oximetry by nurses or paediatric resident/staff and clinical assessment (history taking and physical exam) by only staff doctors or paediatric resident before babies take a bath and vaccination apply and discharge to home.
- Fifth, paediatric cardiologist will be blind the all result of screening
- Sixth, the all positive and negative screening babies will be referral to do echocardiogram with paediatric cardiologist then record the result of echocardiogram into questionnaires form.
- Finally, make the overall evaluation, conclusion, decline all result to parents, and give health education, advice and plan to parents.

Data management and analysis

- Statistical analysis was complete using by SPSS software version 23.
- Used descriptive statistics such as: frequency, percentage, mean, and standard deviation

Ethical clearance

This study will obtain ethical approval from Human Research Ethic Committees, Ministry of Health before commencing the study.

Results

During the cross-sectional study, conducted from July 1st to August 30th, 2023, 600 asymptomatic term newborn babies were screened at the mother and Newborn Hospital nursery unit based on the following inclusion criteria: age 24-72 hours. The median age of screening was 24 hours (ranged 24-72 hours) and the mean +/- SD was 31.80 +/- 11.18. Normal delivery was 80.5% and caesarean section was 19.5%. The median birth weight was 3000 grams (2100-4200). The gender was 50.3% female and 82.7% of the babies lived in Vientiane Capital. 96.8% of the babies were Buddhist and 94.5% were of the Lao-loum ethnic group. Pulse oximetry with clinical assessment screening was positive in 1% (6 of 600) of the babies, while pulse oximetry alone was positive in 0.5% (3 of 600), clinical assessment alone was positive in 0.3% (2 of 600) of the babies and both in 0.2% (1 of 600) (Table 1).

Table 1: General characteristics of 600 term newborns screened by pulse oximetry with clinical assessment for congenital heart disease (CHD)

Variables	Number=600 (%)
Gender	
Male	298 (49.7)
Female	302 (50.3)
Gestational age (week)	
37-38	219 (36.5)
39-40	355 (59.2)
>40	26 (4.3)
Mean ± SD: 38.77 ± 0.952	
Type of delivery	
Normal delivery	483 (80.5)
Cesarean section	117 (19.5)
APGAR score, median (range)	
1 min	8 (5-8)
5 min	9 (6-10)
10 min	10 (9-10)
Birth weight (g)	
Median: 3000, **Min-Max**: 2100 - 4200	
Postnatal age at screening (hour)	
24 - 48h	428 (71.3)
49 - 72h	172 (28.7)
Mean ± SD: 31.80 ± 11.18, **Min-Max**: 24-72	
Right hand SpO2 (%), median	98 (85-100)
Right or left foot SpO2 (%), median	99 (86-100)
POS summary	
POS negative (normal)	594 (99.0)
POS positive	6 (1.0)
Clinical assessment alone	2 (0.3)
Pulse oximetry alone	3 (0.5)
Both pulse oximetry and clinical assessment	1 (0.2)
Diagnosis by Echocardiogram	
No CHD	589 (98.2)
Non-significant CHD	6 (1.0)
Significant CHD	2 (0.3)
Critical CHD	3 (0.5)

Pulse oximetry with clinical assessment detected 5 of 11 cases (45.4% sensitivity) of all congenital heart disease (CHD) and 3 of 3 cases (100% sensitivity) of critical CHD. Pulse oximetry alone detected 3 of 11 cases (27.3% sensitivity) of all CHD and 2 of 3 cases (66.7% sensitivity) of critical CHD. Clinical assessment alone detected 2 of 11 cases (18.2% sensitivity) of all CHD and 1 of 3 cases (33.3% sensitivity) of critical CHD. The specificity of pulse oximetry with clinical assessment was 99.8% for all CHD and 99.5% for critical CHD. The specificity of pulse oximetry alone was 99.8% for both all CHD and critical CHD, and the specificity of clinical assessment was 99.8% for all CHD and 99.5% for critical CHD (Table 2).

Table 2: Accuracy of screening methods for detection of congenital heart disease and critical congenital heart disease in asymptomatic newborn babies (n=600)

	All congenital heart disease			Critical congenital heart disease		
	Pulse oximetry alone	Clinical assessment alone	Pulse oximetry with clinical assessment	Pulse oximetry alone	Clinical assessment alone	Pulse oximetry with clinical assessment
True positives	3	2	5	2	1	3
False negatives	8	9	6	1	2	0
False positives	1	1	1	1	3	3
True negatives	588	588	588	596	594	594
Sensitivity (95%CI)	27.3% (6.0-61.0)	18.2% (2.3-51.8)	45.4% (16.7-76.6)	66.7% (9.4-99.2)	33.3% (0.8-90.6)	100% (29.2-100)
Specificity (95%CI)	99.8% (99.1-100)	99.8% (99.1-100)	99.8% (99.1-100)	99.8% (99.1-100)	99.5% (98.5-99.9)	99.5% (98.5-99.9)
Positive predictive value (95%CI)	61.9% (15.5-93.5)	51.9% (9.6-91.7)	73.0% (25.6-95.5)	80.1% (32.6-97.1)	40.1% (8.6-82.6)	66.8% (39.4-86.1)
Negative predictive value (95%CI)	99.3% (98.9-99.5)	99.2% (98.9-99.4)	99.4% (99.1-99.7)	99.7% (98.4-99.9)	99.3% (98.5-99.7)	100% (99.4-100)
Accuracy	99.1% (98.0-99.7)	99.0% (97.9-99.6)	99.3% (98.2-99.8)	99.5% (98.5-99.9)	98.8% (97.6-99.5)	98.5% (98.5-99.9)

All participants asymptomatic term babies were referred to a pediatric cardiologist for echocardiograms. Eleven of the 600 cases (1.83%) were diagnosed with congenital heart disease, including three cases of critical congenital heart disease: First, single atrium, single ventricle, common atrioventricular valve, double outlet right ventricle, transposition of great arteries, pulmonary artery stenosis, and patent ductus arteriosus (SA, SV, CAVV, DORV, TGA, PS, PDA). Second, hypoplastic left heart syndrome (HLHS) and third, double outlet right ventricle, large ventricular septal defect, pulmonary artery stenosis, and patent ductus arteriosus (DORV, VSD, PS, PDA). Two cases of significant congenital heart disease were diagnosed: perimembranous ventricular septal defect and inlet ventricular septal defect. Six cases of non-significant congenital heart disease were diagnosed, including five cases of patent ductus arteriosus (PDA) and one case of patent ductus arteriosus and patent foramen ovale with pulmonary hypertension (Table 3).

Table 3: Clinical characteristics of newborns with all congenital heart diseases

No	**Sex (M/F)**	**Postnatal age (H)**	**GA (W)**	**BW (g)**	**Oxygen Saturation (%)**	**Diagnosis by echocardiography**	**Pulse rate**	**Heart murmur**
1	M	32	39	2900	90-92	PFO3mm, PDA3.5mm, PHT	156	-
2	F	26	40	3700	98-99	PDA 3mm	110	-
3	M	24	38	2560	98-100	PDA 2.8mm	125	-
4	F	24	40	2600	98-99	PDA 3.3mm	131	-
5	M	31	40	2540	97-98	PDA 2.8mm	117	-
6	F	24	38	2700	97-98	PDA 3mm	137	-
7	M	30	39	2720	98-99	VSD 4.5mm	145	+
8	F	24	37	2400	98-99	VSD 3.5mm	115	-
9	M	24	40	3200	86-88	SA,SV,CAVV, DORV,TGA,PS, PDA or MAPCAs	153	-

No	Sex (M/F)	Postnatal age (H)	GA (W)	BW (g)	Oxygen Saturation (%)	Diagnosis by echocardiography	Pulse rate	Heart murmur
10	F	35	37	2400	87-91	HLHS	146	-
11	M	55	40	3050	95-97	DORV, Large VSD, PS, PDA	157	+

Discussion

Many studies have shown that pulse oximetry screening combined with routine physical exams can effectively detect congenital heart disease (CHD), especially critical congenital heart diseases (CCHD). In developed countries, prenatal ultrasound can detect CCHD in 60% of cases, clinical assessment (physical exam and clinical observation in the first 24 hours of life) can detect CCHD in up to 80% of cases, and pulse oximetry screening after 24 hours of life can detect CCHD in up to greater than 90% of cases [2].

Lao PDR is a low-income country with limited healthcare resources, including a shortage of pediatric cardiologists and echocardiogram machines. Health workers such as obstetricians and pediatricians may not have much experience in the fetal and postnatal diagnosis of CHD.

This was the first study of screening for congenital heart disease (CHD) using pulse oximetry with clinical assessment in 600 asymptomatic term newborn babies at the Central Hospital in Lao PDR. The study found that the sensitivity for detecting all CHD was 45.45% for pulse oximetry with clinical assessment, 27.27% for pulse oximetry alone, and 18.18% for clinical assessment alone. These results are lower than those of a similar study in China, which found sensitivities of 90.2%, 81.3%, and 58.7% for pulse oximetry with clinical assessment, pulse oximetry alone, and clinical assessment alone, respectively [7].

For critical CHD, the sensitivity was 100% for pulse oximetry with clinical assessment, 66.67% for pulse oximetry alone, and 33.33% for clinical assessment alone. For both all CHD and critical CHD, the specificity was 99.50% and 99.83%, respectively.

This study has similar results to a prospective study in China, which found that the sensitivity for detecting critical CHD was 93.2% for pulse oximetry with clinical assessment, 83.6% for pulse oximetry alone, and 77.4% for clinical assessment alone. The specificity for major CHD and critical CHD in the Chinese study was 97.3% and 99.7%, respectively [7].

Another similar study in Thailand found that pulse oximetry screening (POS) could detect three newborns who would have had a missed diagnosis. The sensitivity of POS for critical CHD at Ramathibodi Hospital (RH) was 82.3% vs 100% at Maharat Nakhon Ratchasima Hospital (MH). Overall specificity was 99.9%, and the combination of POS and physical examination (PE) enhanced detection ability to 100% at both hospitals.

In our study, all 600 asymptomatic term newborn babies were diagnosed with congenital heart disease (CHD) in 11 cases (1.8%) by echocardiogram. Three cases were critical CHD (0.5%), and only two cases (hypoplastic left heart syndrome [HLHS] and single atrium, single ventricle, common atrioventricular valve, double outlet right ventricle [DORV], transposition of the great arteries [TGA], pulmonary stenosis [PS], patent ductus arteriosus [PDA] or multiple aortopulmonary collateral arteries [MAPCAs]) were detected by pulse oximetry screening with low oxygen saturation of 86-87% preductal (right hand) and 88-91% postductal (right or left foot). One case (DORV, large VSD, PS, PDA) had normal saturation of 95-97% but was detected with a heart murmur by physical exam. Two significant cases were VSD (0.3%). Six non-significant cases (1%), five cases were PDA, and one case was PFO and PDA with mild pulmonary hypertension. This study showed that using pulse oximetry with clinical assessment was more effective at detecting critical congenital heart disease (CHD) than pulse oximetry alone or clinical assessment alone, consistent with other previous studies.

Of the three critical cases, one case of hypoplastic left heart syndrome (HLHS) died at 15 days of age due to cardiogenic shock. The other two critical cases continue to receive palliative care and follow-up and have not yet undergone any intervention. Of the two cases of ventricular septal defect (VSD), both continue to be followed up. Of the five cases of patent ductus arteriosus (PDA) and one case of patent foramen ovale (PFO) and PDA with mild pulmonary hypertension, all underwent repeat echocardiography at 1 month of age and the defects had spontaneously closed

Limitations of this study

This study has several limitations. First, the sample size is small, which may limit the generalizability of the results. Second, the screening team had limited training and experience in measuring pulse oximetry. Third, some babies were crying or moving during the screening, which could have affected the accuracy of the results. Finally, we were unable to intervene in any cases

of critical CHD due to financial constraints and the lack of available treatment in our country.

Conclusion

Pulse oximetry with clinical assessment screening is more effective at early detection of critical congenital heart disease in asymptomatic term newborns. It has good sensitivity and specificity for both critical and non-congenital heart diseases, including challenging cases that required urgent intervention. These findings suggest that pulse oximetry with clinical assessment screening should be used routinely to screen all newborns for congenital heart disease.

Recommendation

The results of this study suggest that pulse oximetry screening and routine physical examination are more effective for early detection of critical congenital heart disease in asymptomatic newborns. This provides a strong argument for the implementation of congenital heart disease screening as a basic routine.

We recommend that all newborn babies be screened for congenital heart disease after birth for early detection and management. Further studies with larger sample sizes are needed to better understand the increasing prevalence of CHD in neonate babies.

Additionally, we recommend that pulse oximetry machines be available in nurseries and that nursery staff be trained in their use.

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ການແທກອົກຊີແຊນດ້ວຍເຄື່ອງ Pulse oximeter ສົມທົບກັບການກວດຮ່າງກາຍ ເພື່ອຄັດກອງຫາພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດໃນເດັກເກີດໃໝ່ຖ້ວນເດືອນ ທີ່ບໍ່ມີອາການສະແດງ ຢູ່ໃນໂຮງໝໍແມ່ ແລະ ເດັກເກີດໃໝ່

ກູ້ຢ່າງ ເຍ່ຍຈາ, ມາຍຟອງ ມາຍຊາຍ, ຍຸດທະພົງ ວົງສະວາດີວັດ

1. ຄະນະແພດສາດ, ມະຫາວິທະຍາໄລ ວິທະຍາສາດ ສຸຂະພາບ, ນະຄອນຫຼວງວຽງຈັນ, ສປປ ລາວ
2. ສຳນັກງານອະທິການບໍດີ ມະຫາວິທະຍາໄລ ວິທະຍາສາດ ສຸຂະພາບ, ນະຄອນຫຼວງວຽງຈັນ, ສປປ ລາວ
3. ຄະນະແພດສາດ, ມະຫາວິທະຍາໄລ ຂອນແກ່ນ, ປະເທດໄທ

ໄດ້ຮັບຕົ້ນສະບັບ ທີ 18 ກໍລະກົດ 2022, ໄດ້ຮັບບົດທີ່ກວດແກ້ຄືນ ທີ 20 ພະຈິກ 2023, ເຫັນດີໃຫ້ຈັດພິມ 25 ພະຈິກ 2023

ບົດຄັດຫຍໍ້

ປະຫວັດຄວາມເປັນມາ: ພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດ (Congenital heart disease) ແມ່ນຄວາມຜິດປົກກະຕິມາແຕ່ເກີດຊະນິດໜຶ່ງ ທີ່ຫຼາຍກ່ວາໝູ່ ຊຶ່ງຈະກວມເອົາໜຶ່ງສ່ວນສາມຂອງຄວາມຜິດປົກກະຕິທັງໝົດ ແລະ ຍັງເປັນສາຍເຫດຫຼັກຂອງການຕາຍໃນເດັກອ່ອນ ສູງເຖິງ 9.3/1000 ກໍລະນີ ຕໍ່ເດັກເກີດທີ່ມີຊີວິດ. ການບົ່ງມະຕິພະຍາດທີ່ຊັກຊ້າແມ່ນຈະໃຫ້ມີອາການສົມທີ່ຮ້າຍແຮງຕາມມາ ແລະ ຜົນໄດ້ຮັບຂອງການຜ່າຕັດແມ່ນບໍ່ໄດ້ດີ ໂດຍຈະເຮັດໃຫ້ລະບົບຫົວໃຈເສັ້ນເລືອດ ແລະ ອະໄວຍະວະອື່ນໆຊຸດໂຊມຢ່າງຮ້າຍແຮງໄປໃນທີ່ສຸດ, ສະນັ້ນການບົ່ງມະຕິໄດ້ໄວແມ່ນອາດຈະຊ່ວຍຜົນຂອງການປິ່ນປົວພະຍາດດັ່ງກ່າວໄດ້ດີຂຶ້ນ.

ຈຸດປະສົງ: ການແທກອົກຊີແຊນດ້ວຍເຄື່ອງ Pulse oximeter ສົມທົບກັບການກວດຮ່າງກາຍ ເພື່ອຄັດກອງຫາພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດໃນເດັກເກີດໃໝ່ຖ້ວນເດືອນ ທີ່ບໍ່ມີອາການສະແດງ ຢູ່ໃນໂຮງໝໍແມ່ ແລະ ເດັກເກີດໃໝ່

ວິທີວິທະຍາ: ການສຶກສາແບບຕັດຂວາງໄລຍະເວລາຈຸດໃດໜຶ່ງ (cross-sectional study), ຕັ້ງແຕ່ວັນທີ 1 ເດືອນ ກໍລະກົດ ຫາ ວັນທີ 30 ເດືອນ ສິງຫາ ປີ 2023.

ຜົນການສຶກສາ: ເດັກເກີດໃໝ່ທີ່ບໍ່ມີອາການຈຳນວນ 600 ກໍລະນີ, ຖືກບົ່ງມະຕິເປັນພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດແມ່ນ 11 ກໍລະນີ ໃນ 600 ກໍລະນີ (1.83%), ມີ 3 ກໍລະນີເປັນພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດຊະນິດຮ້າຍແຮງ, ອາຍຸສະເລ່ຍແມ່ນ 31.08 +/- 11.18. ເກີດແບບທຳມະຊາດແມ່ນ 80.5%, ນ້ຳໜັກເກີດສະເລ່ຍແມ່ນ 3000 ກຼາມ (2100-4200), ເປັນເພດຍິງແມ່ນ 50.3%. ການກວດຄັດກອງດ້ວຍການວັດແທກອົກຊີແຊນໃນເລືອດສົມທົບກັບການກວດທາງດ້ານອາການຄູນິກ ແມ່ນໃຫ້ຜົນບວກ 1%, ການວັດແທກອົກຊີແຊນໃນເລືອດຢ່າງດຽວແມ່ນ 0.5% ແລະ ການກວດທາງດ້ານອາການຄູນິກແມ່ນຢ່າງດຽວແມ່ນ 0.33%. ການກວດຄັດກອງດ້ວຍການວັດແທກອົກຊີແຊນໃນເລືອດສົມທົບກັບການກວດທາງດ້ານອາການຄູນິກ ແມ່ນກວດພົບພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດ 5 ກໍລະນີ ໃນ 11 ກໍລະນີ (ຄວາມໄວ 45.45%) ແລະ ກວດພົບ 3 ໃນ 3 ກໍລະນີ (ຄວາມໄວ 100%) ທີ່ເປັນພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດຊະນິດຮ້າຍແຮງ, ການກວດວັດແທກອົກຊີແຊນໃນເລືອດພຽງຢ່າງດຽວແມ່ນກວດພົບ 3 ກໍລະນີ ໃນ 11 ກໍລະນີ (ຄວາມໄວ 27.27%) ແລະ ກວດພົບ 2 ໃນ 3 ກໍລະນີ (ຄວາມໄວ 66.67%) ທີ່ເປັນພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດຊະນິດຮ້າຍແຮງ, ການປະເມີນທາງດ້ານອາການຄູນິກພຽງຢ່າງດຽວແມ່ນກວດພົບ 2 ກໍລະນີ ໃນ 11 ກໍລະນີ (ຄວາມໄວ 18.18%) ແລະ ກວດພົບ 1 ໃນ 3 ກໍລະນີ (ຄວາມໄວ 33.33%) ທີ່ເປັນພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດຊະນິດຮ້າຍແຮງ.ຄວາມຈຳເພາະຂອງການໃຊ້ການວັດແທກອົກຊີແຊນໃນເລືອດສົມທົບກັບການກວດທາງດ້ານອາການຄູນິກໃນການຄັດກອງແມ່ນ 98.83% ສຳລັບພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດທັງໝົດ ແລະ 99.50% ສຳລັບພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດຊະນິດຮ້າຍແຮງ, ການກວດວັດແທກອົກຊີແຊນໃນເລືອດພຽງຢ່າງດຽວແມ່ນ 99.83% ສຳລັບທັງພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດທັງໝົດແລະຮ້າຍແຮງ, ສ່ວນການປະເມີນທາງດ້ານອາການຄູນິກພຽງຢ່າງດຽວແມ່ນ 98.83% ສຳລັບພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດທັງໝົດ ແລະ 99.50% ສຳລັບພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດຊະນິດຮ້າຍແຮງ.

ສະຫຼຸບ: ການກວດວັດແທກອົກຊີແຊນໃນເລືອດສົມທົບກັບການກວດຄັດກອງທາງດ້ານອາການຄູນິກແມ່ນມີປະສິດຕິຜົນກ່ວາໃນການກວດຄົ້ນຫາພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດໃນໄລຍະທຳອິດໃນເດັກເກີດໃໝ່ທີ່ບໍ່ມີອາການສະແດງ, ເຊິ່ງຈະມີຄວາມໄວ ແລະ ຄວາມຈຳເພາະທີ່ດີ ສຳລັບໃນການຄົ້ນຫາພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດທັງຊະນິດຮ້າຍແຮງ ແລະ ບໍ່ຮ້າຍແຮງ ລວມໄປເຖິງກໍລະນີທີ່ທ້າທາຍ ເຊິ່ງຈະຕ້ອງໄດ້ຮັບການປິ່ນປົວແກ້ໄຂຢ່າງຮີບດ່ວນ, ຜົນຂອງການສຶກສາເຫຼົ່ານີ້ແມ່ນຊີ້ໃຫ້ເຫັນວ່າຄວນໃຊ້ການວັດແທກອົກຊີແຊນໃນເລືອດຮ່ວມກັບການກວດທາງດ້ານອາການຄູນິກຢ່າງເປັນປະຈຳ ເພື່ອຄັດກອງເດັກເກີດໃໝ່ທັງໝົດສຳລັບໃນການບົ່ງມະຕິພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດ.

ຄຳສຳຄັນ: ພະຍາດຫົວໃຈພິການມາແຕ່ກຳເນີດ, ເດັກເກີດໃໝ່, ການກວດຄັດກອງທາງດ້ານອາການຄູນິກ, ການວັດແທກອົກຊີແຊນໃນເລືອດ

***ຕິດຕໍ່ກັບຜູ້ຂຽນ**: ກູ້ຢ່າງ ເຍ່ຍຈາ, ເບີໂທ: +85620 7605 2504; ອີເມວ: nhiacha.kouyang@gmail.com