

Relationship between Abnormal Cardiography and Cord Blood pH at Birth in Term Pregnancies

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DOI: <http://dx.doi.org/10.21276/ijcmsr.2020.5.3.14>

How to cite this article: Lamia Yusuf, Tahira Fatima. Relationship between abnormal cardiography and cord blood pH at birth in term pregnancies. International Journal of Contemporary Medicine Surgery and Radiology. 2020;5(3):C54-C56.

A B S T R A C T

Introduction: Electronic fetal heart rate monitoring (EFM) involves the use of a cardiotocography (CTG) to record the fetal heart rate (FHR) so as to determine the fetal well-being in order to detect signs of intrapartum hypoxia. The objective of this study was to find relationship between abnormal cardiotocography and cord blood pH at birth in term pregnancies.

Material and methods: This observational study was conducted at department of Obstetrics and gynaecology, Arif Memorial Teaching Hospital during November 2019 to May 2020. From all females or attendants, their contact information, demographic, gestational history was taken. Immediately after the delivery of the baby, about 10 cm of umbilical cord was doubly clamped. Two milliliters of arterial cord blood was taken in a pre-heparinized syringe and sent to laboratory within 10 minutes for assessment of fetal pH. According to operational definition pH levels < 7 was noted. All data was collected on performa by researcher herself.

Results: The data was collected from 323 patients. The mean gestational age was 39.27±5.65 weeks. The mean birth weight of new born was 3189±203.48 grams. The most common perinatal risk factors accompanied with low umbilical artery pH were prolonged rupture of membranes, breech presentation, and meconium stained amniotic fluid. According to data, there was no significant correlation between cardiography and 5th minute umbilical cord pH in term pregnancies.

Conclusion: It is concluded that cardiotocography (CTG) had become a popular method for monitor fetal wellbeing and it is assisting the obstetrician in making decision on the mode of delivery to improve perinatal outcome. But there is no significant relationship between CTG and cord blood pH.

Keywords: Cardiography, Patients, Risk, pH, Pregnancy, Fetal Heart Rate Monitoring

INTRODUCTION

Electronic fetal heart rate monitoring (EFM) involves the use of a cardiotocography (CTG) to record the fetal heart rate (FHR) so as to determine the fetal well-being in order to detect signs of intrapartum hypoxia.¹ Assessment of fetal wellbeing in labour ward by admission cardiotocography helps us to look for already prevailing high risk factors and also new factors that have recently appeared.^{1,2} Suspected fetal distress detected by CTG or Non stress test (NST) and by presence of meconium stained liquor had been the most common indications for cesarean section (CS) for the past few decades. Umbilical cord pH is considered as the best indicator of fetal hypoxemia.³ CTG has emerged as a modern noninvasive tool in detecting nonreassuring fetal status in the last decade.⁴ Its reliability as a sole tool in diagnosing fetal distress is questionable and can lead to unnecessary rise in caesarean section rates.⁴ The proportion of births delivered by CS has increased worldwide significantly⁵ over the past three decades, currently approximately 18.6% of pregnancies being delivered by CS.⁶

A study reported that abnormal CTG was seen in 13.3 % of the babies in which 52.5% babies had pH < 7.⁷ A recent study in 2016 reported that pH of cord blood can be used as an indicator of fetal hypoxemia, hence they reported that among 30 cases who had acidosis on CTG, later 10/30 (33.33%) babies had pH ≤ 7.³

The current study designed to find relationship between abnormal cardiotocography and cord blood pH at birth in term pregnancies in our local population.^{3,7} Through this study if we find higher frequency of low cord blood pH levels at birth with abnormal CTG's then the decisions for planning a C-section was revised on the basis of other indicators. That might help us to reduce overwhelming burden of C-section. The objective of this study was to find relationship between abnormal cardiotocography and cord blood pH at birth in term pregnancies.

MATERIAL AND METHODS

This observational study was conducted at department of Obstetrics and Gynaecology, Arif Memorial Teaching

Hospital, Lahore during November 2019 to May 2020.

Inclusion criteria

- All full term babies (gestational age >37 till 42 weeks of gestation on USG)
- Abnormal CTG

Exclusion criteria

- Women with anomalous baby on ultrasound or after birth.
- Normal CTG.

Data collection

A total of 323 cases meeting inclusion criteria was included in this study after taking an informed consent. The data was taken from Labor room department of Obstetrics and gynecology Arif Memorial Teaching Hospital, Lahore. From all females or attendants, their contact information, demographic, gestational history was taken. Immediately after the delivery of the baby, about 10 cm of umbilical cord was doubly clamped. Two milliliters of arterial cord blood was taken in a pre-heparinized syringe and sent to laboratory within 10 minutes for assessment of fetal pH. According to operational definition pH levels < 7 was noted. All data was collected on performa by researcher herself.

STATISTICAL ANALYSIS

Using SPSS version 22 all data was collected and analysed. For quantitative data like mother's age, parity and gestational age mean \pm standard deviation was used. Frequency and percentage was used for mother's age, parity, mother's obesity and mode of delivery. Post stratified Chi-square test was applied taking p-value ≤ 0.05 as significant.

RESULTS

The data was collected from 323 patients. The mean gestational age was 39.27 ± 5.65 weeks. The mean birth weight of new born was 3189 ± 203.48 grams. The most common perinatal risk factors accompanied with low umbilical artery pH were prolonged rupture of membranes, breech presentation, and

Variables	Low risk (n=47)	P-value
Gestational age (weeks)	39.17 ± 0.56	0.121
Birth weight (grams)	3189 ± 203.48	0.101
Gender	Male	19 (40.42%)
	Female	28 (59.57%)
Need for advanced resuscitation	0 (0%)	0.495

Table-1: Demographic characteristics of neonates and their p-values

Outcome Variables	Abnormal pH Group	Normal pH Group	P value
Need for resuscitation	42 (70)	33 (21.7)	< 0.001
Need for PPV	44 (6.7)	30 (20.1)	0.119
Convulsion	2 (3.3)	30 (20.1)	0.496
HIE	17 (28.3)	14 (6.7)	0.002
Need for NICU admission	16 (26.7)	13 (5)	0.001
Delays in oral feeding initiation until an hour	29 (48.3)	10 (17.7)	0.012
Hospital stay	3.78 ± 3.07	2.28 ± 0.98	< 0.001

Table-2: Umbilical arterial blood pH, base excess and gas values in mothers

meconium stained amniotic fluid (table-1).

According to data, there was no significant correlation between cardiography and 5th minute umbilical cord pH in term pregnancies. Our study which has been carried out for comparison of short outcomes in normal and abnormal umbilical cord pH groups, showed that short outcomes including need to resuscitation, encephalopathy, convulsion, NICU and neonatal ward admission and length of hospital stay, delay in commencement of oral feeding in abnormal umbilical cord pH group are more common than in normal umbilical cord pH group (table-2).

DISCUSSION

Mean \pm SD for umbilical cord pH, NaHCO_3 and PCO_2 in neonates delivered to a high-risk pregnant mother differ significantly with those in low risk mothers but mean (\pm SD) values for PO_2 and base excess did not differ between the two groups. This finding may emphasize the importance of the latter values on prediction of the occurrence of neonatal outcome.⁶ In fact metabolic and respiratory acidosis and hypoxia may jeopardize the baby more than a respiratory acidosis alone. Umbilical artery blood analysis is assumed to give a picture of the acid-base balance of the infant at birth and is considered the gold standard to diagnose neonatal acidemia at birth.⁸ The evaluation of umbilical vein pH has been suggested as an adjunct in order to optimize the understanding of the pathophysiology of the hypoxic events in labor.

Labour is a stressful process, and changes observed on the CTG trace may reflect fetal response to the ongoing hypoxic or mechanical stresses during labour such as compression of the umbilical cord or reduction in the placental blood flow.⁹ Continuous fetal monitoring is mandatory in any fetus considered to be at a 'high risk' of sustaining intrapartum hypoxic injury. It is essential to promptly diagnose 'accidents' related to labour (placental abruption, cord prolapse and uterine rupture) so as to institute timely and appropriate management to improve outcomes.¹⁰

CONCLUSION

It is concluded that cardiotocography (CTG) had become a popular method for monitor fetal wellbeing and it is assisting the obstetrician in making decision on the mode of delivery to improve perinatal outcome. But there is no significant relationship between CTG and cord blood pH.

ACKNOWLEDGEMENTS

The authors would like to acknowledge all mothers and

interns who participated in the research.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 07-07-2020; **Accepted:** 12-08-2020; **Published online:** 05-09-2020