CORRELATION OF NON-REASSURING FETAL HEART RATE PATTERN WITH CORD BLOOD pH AND PERINATAL OUTCOME

KEYWORDS

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INTRODUCTION

Acute fetal hypoxia is one of the most serious pathological conditions in the intrapartum period and is a major risk factor for significant neonatal mortality and morbidity

Electronic fetal monitoring (EFM) is defined as 'the use of electronic fetal Heart-rate monitoring for the evaluation of fetal wellbeing in labour'.

Medical, social and economic advances transformed maternal birth outcomes in the 19th and 20th centuries. The basic principle of intrapartum monitoring is to detect developing fetal hypoxia with the aim of preventing subsequent acidaemia and cell damage. It became commercially available in the 1960s, Subsequently, the intrapartum use of EFM increased rapidly, With the emphasis on improving fetal birth outcomes by detecting fetal hypoxia.

It helps the clinician to intervene the labour in appropriate time either by instrumental or by caesarean section in order to improve the perinatal outcome .The initial response to chronic or slowly developing hypoxia is to increase cardiac output and redistribute this to the brain and heart. The increase in cardiac output is achieved by an increase in heart rate. This may be followed by a reduction in heart-rate variability due to brainstem hypoxia. Continued and worsening hypoxia will eventually produce myocardial damage and heart-rate decelerations.

Acute hypoxia, in contrast, results in a decrease in the fetal heart rate (decelerations or bradycardia) initially produced by chemoreceptor-mediated vagal stimulation but eventually by myocardial ischaemia. Metabolically, progressive fetal hypoxia results firstly in a respiratory acidaemia and secondly in a metabolic acidaemia with tissue injury.

The expectation was that EFM would reduce hypoxia-induced intrapartum perinatal mortality. This has not occurred and the role of EFM in labour has been questioned. Furthermore, the three most recent reports from the Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI) have highlighted problems related to the use and interpretation of EFM. Intraobserver variability may play a major role in its interpretation .

Careful interpretation of FHR patterns could be a useful screening test for fetal asphyxia; however, supplementary tests like fetal scalp ph, fetal ecg ect are required to confirm the diagnosis and to identify the large number of false positive patterns to avoid unnecessary intervention

Here in this dissertation the correlation between non-reassuring CTG and umbilical cord arterial blood pH analysis was done in addition to perinatal outcome .

AIMS AND OBJECTIVES

1. The aim of the study is to Correlate non reassuring CTG using scoring system with umbilical cord arterial blood pH.
2. To find out the perinatal outcome of non reassuring CTG and abnormal cord blood pH.

MATERIALS AND METHODOLOGY

1. Setting :
The study was conducted in Rajah Muthiah Medical College and Hospital between the study period 2012 – 2014 in the department of Obstetrics and Gynecology.

2. Study population:
Pregnant patients of >34weeks gestational age with a single live fetus in cephalic presentation.

3. Type of study
Prospective study.

4. Sample size
The study group consisted of 100 patients.

5. Inclusion criteria:
1. Singleton pregnancy
2. Vertex presentation
3. Gestational Age of >34weeks.

6. Exclusion criteria:
1. Elective LSCS
2. Breech
3. Anomalous babies
4. Multifetal Gestation
5. Gestational age < 34 weeks

Methodology:
All patients will be subjected to CTG, in the active phase of labour. The paper speed being 1cm / min with an external transducer.

Uterine contractions were recorded simultaneously

CTG assessed objectively using Krebs scoring system every 30 mins inactive labour.

Five parameters used in scoring system were
1. baseline Heart rate

2. baseline variability
3. Amplitude (Frequency)
4. Acceleration
5. Deceleration

Each parameters scored 0-2, giving a total score of 10

Three groups were made from the total score, 0-4, 5-7,

8-10 and CTG will be recorded for every ½ hour in active stage of labour

Score	Base-line FHR	Ampli-tude (variability BPM)	Variability OSC. Points/min	Accel-eration	Decelera-tion
0	<100 >180	<5	<3	0	Late or severe Variable Decelera-tion
1	100-119 161-180	5-10	3-6	1-3	Mild or Moderate Variable Decelera-tion
2	120-160	>10	>6	>3	Early or No Decel-eration

Krebs scoring system
Blood collection
Blood collection will be performed following delivery, from immediately isolated segment (10 to 20 cm) of cord with two clamps near the neonate two clamps nearer the placenta. The importance of clamping the cord is underscored by the fact that delays of 20-30 secs can alter both the PCO_2 and

pH. The cord was then cut between the two proximal and two distal clamps. Arterial blood drawn from the isolated segment of cord into a 1-2 ml syringe that has been flushed with a heparin solution containing 1000 U/ml.

The needle capped and the syringe transported on ice to the laboratory.

Results
The CTG value at different time period from active stage of labour upto delivery(1/2, 1, 2,3hrs) will be correlated with cord blood pH and analysis will be done using ch-square test.The baby will be followed until 7days of life to find out the perinatal outcome

RESULTS AND ANALYSIS
1. **Obstetric score**

PARITY	FREQUENCY	PERCENT
Primi	58	58%
Multi	42	42%
Total	100	100%

Shows the obstetric score
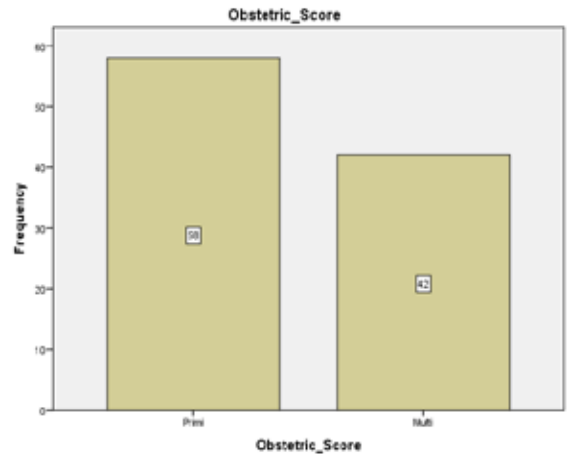
2. **RISK FACTORS**

RISKS	FREQUENCY	PERCENT
Low risks	56	56%
High risks	44	44%
Total	100	100%

Shows The High Risk Pregnancy
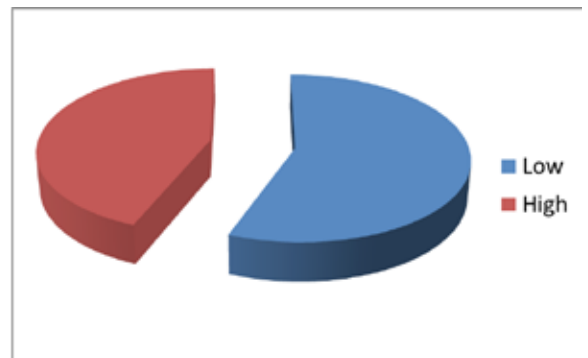
3. **ONSET OF LABOUR**

ONSET	FREQUENCY	INDUCED
Spontaneous	74	74%
Induced	26	26%
Total	100	100%

Shows The Onset Of Labour
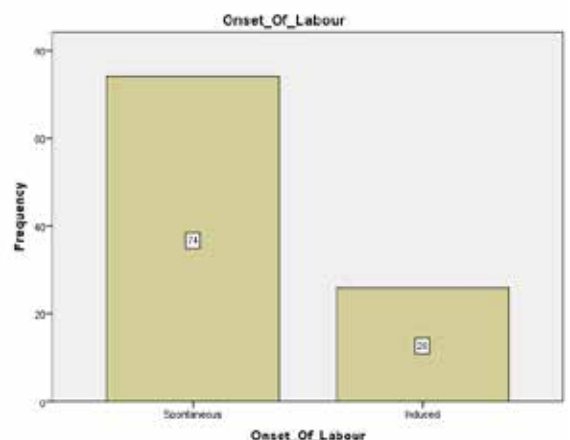
4. RUPTURE OF MEMBRANES

Membranes	Frequency	Percent
SROM	39	39%
PROM	23	23%
ARM	38	38%
Total	100	100%

Shows The Rupture Of Membranes
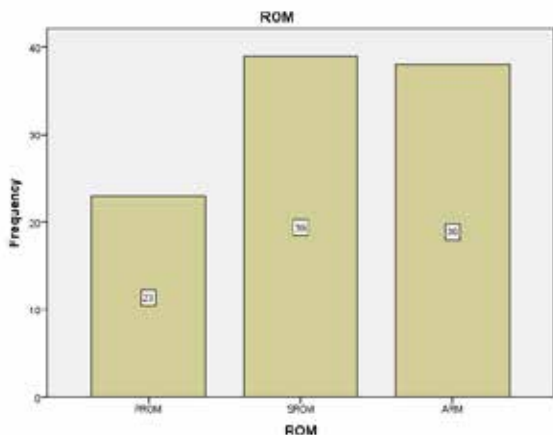
5. Liquor Colour

Liquor colour	Frequency	Percent
Clear	61	61%
G I MSL	20	20%
G II MSL	10	10%
G III MSL	9	9%
Total	100	100%

Shows the liquor colour
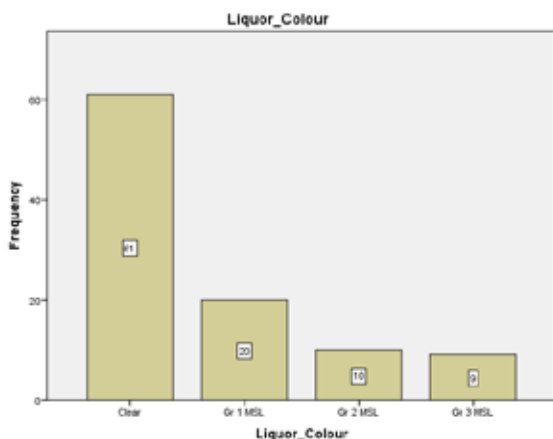
6. Mode of delivery

Mode	Frequency	Percent
vaginal	32	32%
outlet	11	11%
LSCS	57	57%
Total	100	100%

Shows the mode of delivery
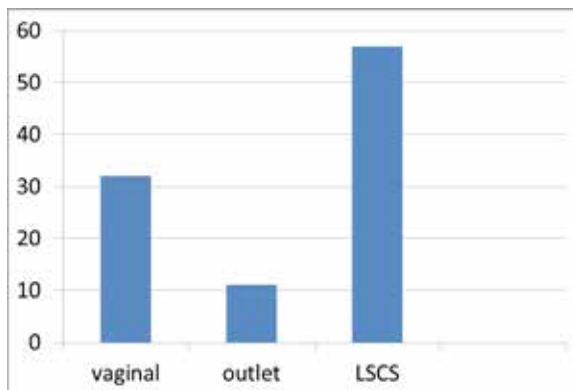
Correlation of CTG score with cord blood pH

All 100 parturients were under continuous CTG monitoring throughout the active phase of labour. The CTG was scored for every half an hour according to Kreb's scoring system Of these 72 patients were in active phase of labour for maximum of 3hrs, 20 were in active phase of labour for maximum of 2hrs, 5 were in active phase for about 1hr and 3 were in active phase for about ½ hr.

Depending upon their initial CTG score they were divided into three groups, group I (initial score 8-10), group II (initial score 5-7), group III (initial score 0-4). Three groups were followed through the course of labour some scores improved, some deteriorated and some remained the same.

Group I (those with initial score of 8-10 in the beginning of active phase of labour)

57 parturients started active labour with score of 8-10, of them 18 patients had the same score upto delivery and the mean pH was 7.28 and 1 neonate had acidosis.

27 out of 56 parturients who started active phase with 8-10 score had the CTG score of 5-7 before delivery they had mean pH of 7.24 and 5 neonates had acidosis.

12 out of 56 parturients who had a score of 8-10 in the beginning of active phase of labour had progressive fall in their score with the time and had a score of 0-4 ½ hr before delivery. They had a mean pH of 7.20 and 6 neonates had acidosis.

Group II (parturients with score of 5-7 in the beginning of active phase of labour).

36 parturients were with CTG score of 5-7 in the beginning of active phase of labour, 16 parturients had the same score till delivery they had a mean pH of 7.24 only 1 neonate had acidosis in this group

2 out of 36 parturients had a improvement in their score and they had a score of 8-10 before delivery and had a mean pH of 7.22. No neonate had acidosis.

18 parturients out of 36 who stared with score of 5-7 had score of 0-4 prior to delivery. This group had a mean pH of 7.17 and 8 neonates had acidosis in this group.

Group III(those with CTG score of 0-4 at beginning of active phase of labour)

7 parturients were with score of 0-4 on admission.

Out of 7 , 5 parturients were with the same score for 3hrs and had a mean pH of 7.18. 3 neonates had acidosis in

this group.

1 neonate was with score of 0-4 and delivered in about of maximum of 2hrs and had pH 7.05

1 neonate had the score 0-4 and delivered within 1/2hr by LSCS and had pH 7.25 there was no acidosis in this neonate.

Correlation of CTG score 1/2hr before delivery with that of umbilical cord blood pH

		pH_group		Total
		pH<7.15	pH>7.15	
	8-10	1	19	20
	5-7	6	36	42
	0-4	19	19	38
Total		26	74	100

Correlation of CTG score 1/2hr before delivery with that of umbilical cord blood pH

Fisher's Extact Test was used to correlate the CTG score with umbilical cord blood pH.
1/2hr CTG score Vs pH

CTG score	% of patient	
8-10	5%	95%
5-7	14.2%	85.8%
0-4	50%	50%

P value- 0.00
< than 0.05-significant

This table shows significant correlation between acidosis and CTG ½ hr before delivery

Correlation of CTG score 1hr before delivery with umbilical cord blood pH

		pH_group		Total
		pH<7.15	pH>7.15	
	8-10	6	41	47
	5-7	16	28	44
	0-4	4	2	6
tal	To-	26	71	97

Correlation of CTG score 1hr before delivery with umbilical cord blood pH

Fisher's Exact Test Analysis
1hr CTG score Vs pH

CTG score	% of patients	
8-10	12.7%	87.2%
5-7	36.3%	63.6%
0-4	66.6%	33.3%

P value-.002,
<0.05-significant

This table shows the significant correlation between acidosis and CTG 1hr before delivery

Correlation of CTG score 2hrs before delivery with umbilical cord blood pH

		pH_group		Total
		pH<7.15	pH>7.15	
	8-10	12	43	55
	5-7	8	24	32
	0-4	3	2	5
Total		23	69	92

Correlation of CTG score 2hrs before delivery with umbilical cord blood pH

Fisher's Exact Test Analysis
2hrs CTG score Vs pH

CTG score	% of patients	
8-10	21.8%	78.1%
5-7	25%	75%
0-4	60%	40%

P value-0.17,
>0.05- Not significant

This table shows that there no significant correlation between acidosis and CTG score 2hrs before delivery

Correlation of CTG score 3hrs before delivery with umbilical cord blood pH

		pH_group		Total
		pH<7.15	pH>7.15	
	8-10	7	36	43
	5-7	7	17	24
	0-4	3	2	5
Total		17	55	72

Correlation of CTG score 3hrs before delivery with umbilical cord blood pH

Fisher's Exact Test Analysis
3hrs CTG score Vs pH

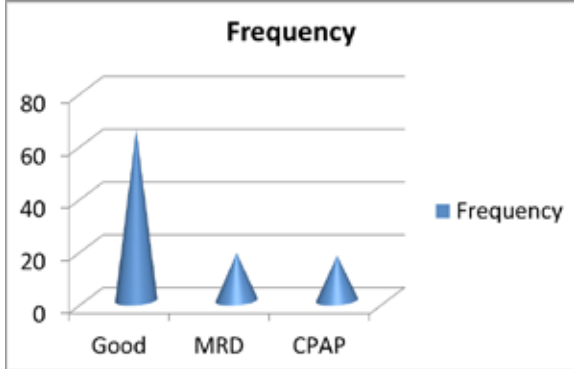| CTG score	% of patients	
8-10	16.2%	83.7%
5-7	29.1%	70.8%
0-4	60%	40%

P value-0.06
> 0.05-Not Significant

This table shows that there is no significant correlation between acidosis and CTG score 3 hrs before delivery.

NEONATAL OUTCOME

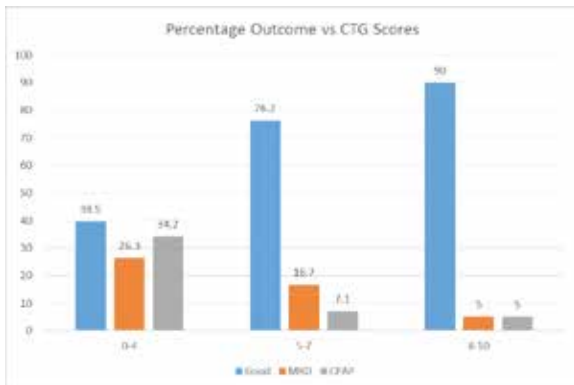| Outcome	Frequency	Percent
Good	65	65%
MRD	18	18%
CPAP	17	17%
Total	100	100%

Shows the Neonatal outcome

Out of 100 neonates,

65 neonate had good outcome

18 had mild respiratory distress(MRD)

17 was on CPAP(continuous positive airway pressure)

There was no neonatal death

Shows the neonatal outcome of various CTG scores

DISCUSSION

CTG shows the wellbeing of the fetus during the course of labour. It has high inter and intra observer variation. There is also high false positive rate.Although FHR monitoring is widely used for fetal surveillance there is still disagreement about the value of CTG and the interpretation of FHR patterns .

In our Prospective study umbilical cord blood pH values at the time of delivery were related to Fetal Heart Rate patterns classified according to Krebs scoring system and perinatal outcome of these two parameters were assessed..

Out of 100 study population 58 were Primi and 42 were Multi. 56 patient belonged to Low risk pregnancy and 44 had high risks like Anemia, gestational hypertension , diabetes, Bad obstetric history, oligohydramnios, HbsAg positive,Rh-ve complicating pregnancy. One patient was positive for antiphospholipid antibody.

Out of 100 patients 74 had spontaneous onset of labour and 26 had induced labour.

39 patients had spontaneous rupture of membranes, 23 had premature rupture of membranes and in 38 artifical rupture of membranes was done.

Liquor colour has significance because birth asphyxia is seen with meconium stained liquor. 61 had clear liquor

20 had Grade I meconium stained liquor,10 had GradeII meconium stained liquor and 9 had Grade III meconium stained liquor.

Out of 100 patients 32 delivered by spontaneous vaginal delivery,in 11 patients outlet forceps was applied and 57 patients was delivered by LSCS and the major indication Fetal distress.

A step down of CTG score was observed in our group of parturients.

In Group I(8-10) 21% parturients had a stepdown of krebs score to 0-4 at the time of delivery and in them 50% of neonates had acidosis

In Group II(5-7) 50 % parturients had a stepdown of krebs score to 0-4 at the time of delivery and in them 44% of neonates had acidosis

In Group III(0-4) 57% of neonates had acidosis.

Correlation between CTG score and pH at time intervals was done ,

CTG scoring at ½ an hour, 1 hour, prior to delivery correlated well with umbilical arterial pH at birth. P value 0.00 for ½ an hour score, p value of 0.002 for the 1 hour score.

There was no significant correlation with umbilical arterial pH at birth and CTG score taken 3 hrs and 2 hrs prior to delivery with p value of 0.17 and 0.06 respectively.

Joel D Larma et al., found sensitivity of 7.7%, specificity of 98.9%, positive predictive value of 50%, and negative predictive value of 88.6% with poor CTG score for outcome as acidosis. In our study we have found sensitivity of CTG with a poor score of 0-4 for the outcome as acidosis of the neonate is 73.1%, Specificity of the same was 74.30%.

Positive predictive value i.e., with a poor CTG score of 0-4, the probability of acidosis for the neonate is 50% Negative predictive value i.e, with a good CTG score of either 5-7/8-10, the probability of delivering a non acidotic neonate is 88.70%, and accuracy of test was 74%

CONCLUSION

1. There was a significant correlation (P<0.01) between low CTG scores and acidosis. Rapid deterioration of

CTG scores were found to require immediate intervention to prevent acidosis.

2. Sensitivity of CTG with a poor score (0-4) for the outcome as acidosis is 73.1%, specificity of the same was 74.3%.

3. PPV i.e, with a poor CTG score the probability of the acidosis in the neonate is 50%

4. NPV i.e., with the good CTG score 5-7 / 8-10 the probability of delivery of a non acidotic neonate is 88.7%.Application of scoring system in interpretation of CTG in labour helps to reduce inter and intra observer variation in interpretation and provides the obstetrician a yard stick to measure fetal well being in labour.

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