INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

STUDY OF CORRELATION BETWEEN UMBILICAL CORD BLOOD pH AND NEONATAL OUTCOME IN CASE OF FETAL DISTRESS

Obstetrics & Gynaecology

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ABSTRACT

Introduction: In recent years, Caesarean section rates are increased and most common indication being fetal distress. Fetal distress basically occurs due to fetal hypoxemia because of various reasons either maternal or fetal cause. Thus, to know the immediate outcome of baby delivered through caesarean section, umbilical cord blood pH in cases with abnormal cardiotocography and/or meconium stained liquor has emerged out to be the best indicator of fetal hypoxemia and to give the prognosis of baby delivered.

Aims and Objectives: To study the relation between fetal distress and umbilical cord blood pH. To study the impact of different cause of fetal distress on immediate post-partum baby delivered by emergency caesarean section.

Materials and Methods: This study was a Cross-sectional observational study conducted during period from 01.03.2018 to 31.10. 2019 in the department of Obstetrics and Gynecology, civil hospital Ahmedabad. 100 patients Undergoing Emergency Caesarean Section for Fetal Distress diagnosed clinically were selected in the Study during the study period. Data was collected as pre-designed pre-tested questionnaire of study variables. Blood collection was performed following delivery by caesarean section, from immediately isolated segment (10 cm) of cord and sent for pH analysis via radiometer ABL system 600.

Result: Distribution according to etiology of fetal distress, it was recognized that oligohydramnios pregnancy was maximum (30%) (majority underwent induction of labour), postdate secured second position (18%). Relation between pH value and cause of fetal distress to the fetal outcome we found out that, irregular rhythm heart rate babies (12 out 0f 100) had low pH value.i.e. <7.1 with maximum referrals to NICU.

Conclusion: Umbilical cord arterial blood pH as a predictor of intrapartum hypoxia is considerable in determining neonatal outcome. < 7.1 pH is associated with increased risk of adverse neonatal outcome.

KEYWORDS

1.INTRODUCTION:

The world of obstetrics rotates around its final outcome in terms of a healthy baby, who cries immediately at birth and goes home with its mother without any interventions. Delayed cry of a neonate due to antenatal or intranatal asphyxia, requiring extensive interventions or unwanted morbidity or mortality. In recent years, Caesarean section rates are increased and most common indication being fetal distress. Fetal distress may be defined as a physiological state in which there is metabolic acidosis secondary to hypoxia. Fetal distress basically occurs due to fetal hypoxemia because of various reasons either maternal or fetal cause. Non-reassuring fetal status is not an adverse event per se, but rather an indication of an underlying condition resulting in temporary or permanent oxygen deprivation to the fetus which may lead to fetal hypoxia and metabolic acidosis. [1] Thus, to know the immediate outcome of baby delivered through caesarean section, umbilical blood pH has emerged out to be the best indicator of fetal hypoxemia and to give the prognosis of baby delivered. [2] Fetal hypoxia that may lead to indicate changes in fetal heart patterns, reduced fetal movement, fetal growth restriction and presence of meconium stained liquor. [3] The fetal heart rate changes markedly in response to prolonged oxygen deprivation, making fetal heart rate monitoring a potentially valuable and commonly used tool for assessing fetal oxygenation status in real time 4.

2.MATERIALS AND METHODS

This study was a cross sectional observational study conducted in Dept. of Obstetrics and Gynecology b j medical college civil hospital Ahmedabad. in duration between 1st march 2018 to 31stOctober 2019. Sample size of the study was 100. Patients were selected who underwent for caesarean section as per inclusion criteria.

Inclusion criteria
1. Patient giving informed consent. Caesarean section with the indication as fetal distress.
2. Gestational age ≥37 week (completed) from the last menstrual period or first trimester scan.
3. The pregnancy must be singleton with cephalic presentation and longitudinal lie.

Exclusion criteria
1. Caesarean section done for other than fetal distress as indications.

2. Gestational weeks below 37 weeks
3. Mal-presentations
4. Multiple gestations
5. All high risks pregnancy (anemia, hypertension, thyroid disorders, diabetes epilepsy, asthma)
6. Elective caesarean sections

Sampling
All consecutive patients who underwent caesarean section for fetal distress from the start of the study until the target was reached were invited to participate in the study as long as they met the inclusion criteria and gave consent.

Data was collected as pre-designed pre-tested questionnaire of study variables. Blood collection was performed following delivery by caesarean section, from immediately isolated segment (10 cm) of cord with two clamps near the neonate two clamps nearer the placenta.

The cord was then cut between the two proximal and two distal clamps. Arterial blood was drawn from the isolated segment of cord into a 2ml syringe that were pre-heparinized lithium syringes. The needle was capped and the syringe transported on to the laboratory (Although efforts should be made to transport the blood promptly, neither the pH nor pCO2 change significantly in blood kept at room temperature for up to 60 minutes). After that all the samples were tested for pH analysis via radiometer ABL system 600. All the outcomes were evaluated by appropriate statistical tests and results were outlined.

3. RESULTS
The present study of 100 cases "study to evaluate correlation between umbilical cord blood pH and neonatal outcome in case of fetal distress" was done and observations were evaluated by different statistical tests and outcome was assessed. Out of 100patients, (72.2%) were single-para and (27.8%) were multi- para. All the patients were 18 to 36-year-old and their mean age was 24.07 year.

Table 1: Distribution of study subjects according to fetal distress & its etiology-

Causes of Fetal Distress	16	16%
No Cause found		
Oligohydramnios	30	30%

Post Dated	18	18%
Abruption placenta	6	6%
Premature Rupture of Membrane	18	18%
Nuchal Cord	12	12%
Total	**100**	

Out of 100 cases of fetal distress 30% were because of oligohydramnios and 18% because of postdated pregnancy.In 16(16%) no cause was found.

Table 2: Distribution of study subjects according to cause of fetal distress with NICU admissions

Causes of Fetal Distress	NICU admission	Neonatal death
No Cause	0	0
Oligohydramnios	4	0
Post Dated	5	0
Abruption	5	3
PROM	2	0
nuchal cord	0	0
Total	16	3

Out of 100, 5 babies of abruption placentae had NICU admissions followed by 5 babies of post datism. For other causes, none had referral but abruption placentae babies were maximum neonatal death. This was found to be statistically significant.

Table 3: Distribution of study subjects according to pH of umbilical arterial cord blood

pH of umbilical arterial cord blood	Number	Percentage
<7.1	14	14%
7.1-7.3	74	74 %
>7.3	12	12 %
Total	100	100.0 %

Out of 100 cases, among most of (74%), pH of Umbilical Arterial Cord Blood was 7.1 to 7.3 and among (12%), it was more than 7.3.

For evaluating the immediate fetal outcome, umbilical arterial cord blood was collected to ascertain its pH value to rule out fetal acidosis and Apgar score was calculated both at 1min and 5min.

Table 4: Distribution of study subjects according to severity of fetal distress & pH of umbilical arterial cord blood
Fetal Distress   pH of Umbilical Arterial Cord blood

	<7.1 N	7.1-7.3 N	>7.3 N
Bradycardia	2	60	10
Tachycardia	0	10	1
Irregular	12	4	1
Total	14	74	12
Chi Square Value	45.0138		
Significance 'p' Value	0.00001		

Out of 100 patients, 60 had bradycardia with 7.1 to 7.3 pH while 12 patients with irregular heart rate had less than 7.1 pH. There was statistically significant association found in severity of fetal distress & pH of Umbilical Arterial Cord Blood. (p=0.001)

Table 5: Distribution of study subjects according to causes of fetal distress & pH of umbilical arterial cord blood
PH of Umbilical Arterial Cord Blood

	<7.1 N	7.1-7.3 N	>7.3 N
Causes of Fetal Distress			
NO Cause	0	14	2
Oligohydramnios	4	22	4
Post Dated	4	12	2
Abruptio	5	1	0
Premature Rupture of Membrane	1	15	2
Nuchal Cord	0	10	2
Chi Square Value	91.350		
Significance 'p' Value	0.003		

It shows 4 cases with oligohydramnios cause of fetal distress had more than 7.3 pH and 5 abruption patients had less than 7.1. While most of patients in all causes had 7.1 to 7.3. There was statistically significant association found in causes of fetal distress & pH of Umbilical Arterial

Cord Blood. (p=0.005)

In group of patients having oligohydramnios out of 30 patients only 4 patients had pH of <7.1.

This suggest that oligohydramnios is not a major cause for NICU admissions and having good neonatal outcome.

Table 6: Reveals distribution of study subjects according to causes of fetal distress & APGAR score at 1 and 5 minutes

Fetal Distress	No Cause	Oligo-hydramnios	Post Dated	Abruptio	PROM	Nuchal cord
APGAR (1 Min)						
7-10	0	0	0	0	0	0
4-6	16	30	18	1	18	12
≤3	0	0	0	5	0	0
7-10	15	26	13	0	16	11
4-6	1	4	5	2	2	1
≤3	0	0	0	4	0	0
Total	16	30	18	6	18	12

Chi square – 49.003
Significance p value – 0.0004

Among the causes of fetal distress, abruptio placenta babies; at 1 minute- 5 had less than 3 APGAR score after 5 minute it increased and 2 had 4-6 score. While among oligohydramnios cause, 30 had 4-6 score at 1 minute and after 5 minute it increase and 26 had 7-10 score. So, there was statistically significant difference found in distribution of study subjects according to Causes of fetal distress & APGAR score. (p=0.005).

It was observed in the study that irregular fetal heart patterns seen in patients with abruption placenta 5 had the babies with worst Apgar score <3 both at 1 minute and 5 minutes. Out of 6 babies, 4 babies had poor Apgar score of <3 even at 5 minutes; these babies also had umbilical arterial cord blood pH value < 7.1, needed intubation and NICU admissions, finally associated with 3 neonatal death on day 07. These observations were being highly significant to the p value; thus, to correlate well with pH and denote fetal acidosis. But for remaining 1 baby, managed to improve their Apgar score of 4-6 at 5 minutes, of these 01 babies 01 had pH value <7.1 which were alive but remain admitted in NICU till day 07; these babies could survive but could present with some of the complication of Hypoxic ischemic encephalopathy. Rest 01, though had poor Apgar at 1 minutes and improved at 5 minute had pH value between 7.1-7.3 can have better prognosis.

Table 7: Distribution of study subjects according to 5 min APGAR score & pH of umbilical arterial cord blood
PH of Umbilical Arterial Cord Blood

	<7.1	7.1-7.3	>7.3
APGAR Score	N	N	N
<3	4	0	0
4-6	10	3	2
>7	0	71	10

Maximum number of neonates with APGAR Score >7 were having pH>7.1 And neonates with pH<7.1 out of 14 , 4 neonates were having APGAR <3.

4. DISCUSSION
This study aims to justify the ever-increasing rate of caesarean section for indication of fetal distress by comparing the pH value of umbilical arterial cord blood and Apgar score of newborn.

Distribution according to etiology of fetal distress [Table] it was recognized that oligohydramnios pregnancy was maximum 30(30%) (majority underwent induction of labour), postdate secured second position 18(18%) and prom 18(18%) and abruption was found to be a cause in 6 (6%) patients, however no cause could be identified in 16 patients. Similar opinion found in Manjusha Agarwal et al [20 17], that stated that postdated pregnancy is the most common indication for increasing number of emergency caesarean section for fetal distress. Also, Richa Kansal, Isha Bansal et al [2017] and Kalavathi Dharam raj Biradar et al[2016] found that oligohydramnios is emerging as one of

the common indication for emergency caesarean section for fetal distress.

Accordingly, in Table ; Out of 100 babies that were delivered during emergency caesarean section, 16 had NICU admissions with 3 babies died in 07 days of birth. However, these 14 babies had poorest pH value of <7.1.

For discussion based on relation between pH value and cause of fetal distress to the fetal outcome we found out that, irregular rhythm heart rate babies had low pH value.i.e. <7.1 and maximum referrals with poor Apgar score at 1min (<3) and at 5min (<3). Out of 100 babies 5 hadApgar score <3 at 1 min, out of which 4 continued to have Apgar score <3 at 5mins. These babies were referred to department of Pediatrics and3 baby were not alive beyond day 2-4. These 3 underwent emergency caesarean section for abruption placenta. Fouzia Perveen et al (2015) also had similar results "Significance of cord arterial blood pH as a predictor of intrapartum hypoxia is considerable in determining neonatal outcome but at pH level > 7.1 the neonatal neurologic morbidity is not so evident. Although moderate degree of acidemia < 7.1 is associated with increased risk of adverse neonatal outcome."

According to Table Oligohydramnios is also emerging to be as one of the major indication in current scenario. It usually takes 30-90 minutes to get a healthy baby delivered from diagnosis and decision to delivery interval of fetal distress. For babies, that are delivered after 90 minutes gap adversely affected the fetal outcome; well co-related with pH of umbilical arterial cord blood. In almost all cases of abruption placenta, babies who had irregular heart rate had poor Apgar score and reflected as acidotic babies with unfavorable pH<7.1.

Also, similar findings seen by Pradeep Meena et al (2017) also stated that "It was noted that as the severity of HIE increases, the values of mean APGAR score and cord blood pH decreases, which is inversely proportion to duration and severity of intrauterine/intra partum asphyxia. Also, Goldaber et al (1991), who studied the association between umbilical arterial acidosis and adverse neurological events among 3506 term, singleton infants with cord arterial pH < 7.20; 18 were reported that neonatal death was much more likely at pH< 7.00, the cut-off at which seizures became more likely was pH<7.05.

5.CONCLUSION
Umbilical cord arterial blood pH as a predictor of intra partum hypoxia is considerable in determining neonatal outcome. < 7.1 pH is associated with increased risk of adverse neonatal outcome.

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