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Original Research Article

Abnormal CTG Findings and Perinatal Outcome in Low-Risk Term Pregnancies

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Abstract

Background: Cardiotocography is a fetal surveillance modality used to detect fetal hypoxia and help reduce perinatal morbidity and mortality. Abnormal findings on CTG can lead to early intervention and improve perinatal outcomes.

Methods: This was an observational study where 94 low-risk pregnant patients with abnormal CTG tracings were selected. All of them underwent emergency caesarean section. Perinatal outcome was measured by noting APGAR scores at 1 minute and 5 minutes and the need for NICU admission.

Results: Out of the 94 patients, 42 (44.6%) were ≤25 years and 52 (55.4%) were >25 years. Primigravida accounted for 64 (68%) and multigravida 30 (32%). Gestational age was <37 weeks in 21 (22.3%) and ≥37 weeks in 73 (77.6%). There were 52 (55.4%) male babies and 42 (44.6%) female babies. Birth weight was <2.5 kg in 26 (27%) and ≥2.5 kg in 68 (73%). APGAR scores at 1 minute were ≥7 in 89 (95%) and <7 in 5 (5%). At 5 minutes, APGAR scores were ≥7 in 90 (96%) and <7 in 4 (4%). NICU admission was required for 57 (60%) babies. CTG findings were suspicious in 61 (65%) and abnormal in 33 (35%). NICU admission was noted in 22 (23.4%) of the abnormal CTG group and 35 (37.3%) of the suspicious CTG group. No statistical significance was found in the association between CTG findings and NICU admission (p=0.247) or between CTG findings and low APGAR scores at 1 minute (p=0.353) and 5 minutes (p=0.304).

Conclusion: The study showed that while CTG abnormalities lead to emergency interventions, they do not necessarily predict poor immediate neonatal outcomes. The association between abnormal CTG findings and NICU admission or low APGAR scores was not statistically significant. Further research with larger sample sizes is needed to explore these associations more definitively.

Keywords: Cardiotocography, Perinatal outcome, abnormal pregnancy, Risk pregnancy, APGAR, NICU.

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Introduction

Fetal surveillance in the antepartum and intrapartum period is important to reduce perinatal morbidity and mortality. [1]

This surveillance can be done by fetal heart rate auscultation, cardiotocography (CTG), contraction stress test, Doppler velocimetry, fetal scalp blood pH, biophysical and modified biophysical profile and serum lactate level. [1]

Electronic fetal monitoring by CTG is used to detect fetal status in intrapartum and antepartum period. [2] CTG is a record of uterine contractions and fetal heart rate represented graphically on a paper. [2] Uterine contractions cause reduction in uteroplacental perfusion and thereby cause fetal hypoxia. Normally the fetus can handle this hypoxia by peripheral chemoreflex activation. [3]

CTG is useful to detect fetal hypoxia and its related complications [3] and thereby helps in improving perinatal outcome.

The aim of this study was to correlate the perinatal outcome with the abnormal cardiotocography findings in low-risk term pregnancies.

Materials and Methods

This observational prospective study was conducted in the department of Obstetrics and Gynaecology, at KIMS Hospital – a tertiary healthcare centre, among term pregnant women

over a period of one year - 2024. Data was collected and entered in excel sheet.

Inclusion Criteria:

- All women with live, singleton pregnancy
- Induced or in spontaneous labour
- No known high-risk factors – like anemia, hypertensive disorder of pregnancy, Rh isoimmunization, diabetes, thyroid, renal disease, post datism, fetal growth restriction

Exclusion Criteria:

- Preterm labour
- Multiple pregnancies
- Medical or surgical or obstetrical complications
- History previous caesarean section
- Abruption, cord prolapse
- Dead / malformed fetus

Methodology

- After obtaining approval from the institutional ethics committee, data of pregnant women with abnormal CTG was entered in MS Excel spreadsheet.
- Basic data like age, gravidity, gestational age, comorbidities if any was recorded.
- Data entered was analysed.
- They were followed up clinically and by electronic fetal monitoring by cardiotocography (CTG) during labour
- Active management and intervention were done for women with abnormal CTG findings.
- CTG findings were classified according to NICE guidelines as reassuring, suspicious, and pathological. [4]
- Normal/reactive/reassuring – baseline FHR – 110-160bpm, baseline variability up to 5-25bpm, at least 2 accelerations – 15bpm for 15 second duration above the baseline, no deceleration in 20 minutes duration.
- Suspicious/equivocal – moderate tachycardia – 160-180bpm, moderate bradycardia – 100-109bpm, reduced baseline variability up to <5-25bpm, at least 2 accelerations – 15bpm for 15 second duration above the baseline, no deceleration in >40 minutes but <90 minutes.
- Ominous/Pathological – baseline FHR>180bpm, or <100bpm, sinusoidal pattern for 10 minutes of baseline variability <5bpm for >90 minutes.
- Perinatal outcome was measured using APGAR score at 1 minute and 5 minutes after birth, liquor colour
- APGAR score <7 at 1 minute was considered low [5]

Results

In this study 94 patients were included. Age wise distribution of the pregnant women showed that 42 (44.6%) were less than 25 years and 52 (55.4%) were more than or equal to 25 years of age. Primigravida were 64 (68%) and multigravida were 30 (32%). Patients with less than 37 weeks period of gestation were 21 (22.3%) and >/=37 weeks were 73 (77.6%).

All of them underwent emergency caesarean section in view of abnormal cardiotocography findings.

Out of these 52 (55.4%) were male babies and 42 (44.6%) were female babies. Babies with birth weight <2.5kg were 26 (27%) and >/=2.5kg were 68 (73%). (Table 1)

Table 1: Demographic characteristics of the study subjects

Mother's age in years	**N (%)**
≤25 years	42 (44.6)
25 years	52 (55.4)
Gravida	
Primigravida	64 (68)
Multigravida	30 (32)
Gestational age in weeks	
<37 weeks	21 (22.3)
≥37 weeks	73 (77.6)
Gender of baby	
Male	52 (55.4)
Female	42 (44.6)
Birth weight	
<2.5kg	26 (27)
>/=2.5kg	68 (73)

APGAR score at 1 minute was more than or equal to 7 in 89 babies (95%) and <7 in 5 babies (5%). APGAR score at 5 minutes was more than or equal to 7 in 90 babies (96%) and <7 in 4 babies (4%). NICU admission was required for 57 babies of the mothers who had CTG changes – abnormal/suspicious (60%). (Tabel 2)

Table 2: Perinatal outcome based on APGAR and NICU admission.

APGAR score at 1 min	N (%)
<7	5 (5)
>/=7	89 (95)
APGAR score at 5 min	
<7	4 (4)
>/=7	90 (96)
NICU admission	
Yes	57 (60)
No	37 (40)

CTG findings noted were suspicious/non reassuring in 61 (65%) and abnormal in 33 (35%). Out of those in the suspicious or non-reassuring CTG group – 25 (41%) patients had moderate tachycardia – 160-180bpm fetal heart rate, 10 (16%) patients had moderate bradycardia – 100-109bpm fetal heart rate and 26 (43%) patients had reduced beat to beat variability – between 5 – 25 bpm. Among those with abnormal/pathological CTG – 16 (48%) had decelerations, 6 (18.5%) had persistent tachycardia – FHR >180bpm, 5 (15%) had persistent bradycardia – FHR < 100bpm, 6 (18.5%) patients had poor beat to beat variability < 5bpm. (Table 3)

Table 3: CTG findings noted in study subjects

CTG Findings	N (%)
Suspicious	61 (65)
- Moderate tachycardia	25 (41)
- Moderate bradycardia	10 (16)
- Poor beat to beat variability (5-25bpm)	26 (43)
Abnormal	33 (35)
- Decelerations	16 (48)
- Persistent tachycardia	6 (18.5)
- Persistent bradycardia	5 (15)
- Poor beat to beat variability (<5bpm)	6 (18.5)

The relationship between CTG findings and NICU admission were noted. 22(23.4%) babies had NICU admission in the abnormal CTG findings group and 35(37.3%) babies had NICU admission among those having a suspicious CTG trace. 10(10.6%) babies were not admitted to NICU in the abnormal CTG findings group and 27(28.7%) babies were not admitted to NICU in the group with suspicious CTG findings. (Table 4)

Table 4: Comparison of CTG findings and NICU admission

	NICU admission		
CTG Findings	Yes	No	Total
Abnormal	22 (23.4%)	10(10.6%)	32
Suspicious	35 (37.2%)	27(28.7%)	63
Total	57	37	94

P – Value for the above association was 0.247 which was not statistically significant.

The above association of CTG findings and NICU admission showed that a higher percentage of abnormal CTG trace group had NICU admission when compared to the suspicious CTG trace, but no statistical significance was noted.

The patients with suspicious CTG findings whose babies had APGAR at 1 minute <7 was 5 and in patients with abnormal CTG findings, whose babies had APGAR<7 at 1 minute were 1. P-value for this association was 0.353 which had no statistical significance. The patients with suspicious CTG findings whose babies had APGAR at 5 minutes <7 was 2 and in patients with abnormal CTG findings, no babies had low APGAR. P-value for this association was 0.304 which had no statistical significance.

Discussion

Early detection of fetal distress can prevent birth asphyxia if timely intervention is done. Fetal monitoring by CTG is commonly used for this so that delivery can be expedited if necessary. [1] This noninvasive method of detecting abnormal fetal heart rate and non-reassuring fetal heart rate can help reduce perinatal mortality and morbidity. [2]

In this study of 94 pregnant women with abnormal CTG tracings were included and neonatal outcome was noted with respect to NICU admission and

APGAR score at 1 minute and 5 minutes. The age wise distribution of the pregnant women showed that most of them (52) were more than or equal to 25 years of age. This is contrary to that noted in the study by Singh et.al. Which had 85.4% patients aged less than 25 years. [1]

Primigravida were 68% and multigravida were 32%. Majority of the patients were of term gestation - 73 (77.6%). All of them underwent emergency lower segment caesarean section in view of abnormal cardiotocography findings. Out of these babies with birth weight <2.5kg were 26 (27%) and >/=2.5kg were 68 (73%). NICU admission was required for 57 babies (60%).

Singh et.al. In their study among 500 patients, noted 465 having normal CTG, 35(7%) patients having non-reassuring CTG and abnormal CTG in 5(1%) patients. [1]

CTG findings noted in our study were suspicious/non reassuring in 61 (65%) and abnormal CTG in 33 (35%) which was more than that noted in study done by Singh et.al. [1]

Out of those in the suspicious or non-reassuring CTG group, the most common change noted was reduced beat to beat variability – 26(43%). Among those with abnormal/pathological CTG – most of the patients - 16 (48%) had deceleration. This was similar to that noted by Charu et.al. In their study with deceleration being the most common finding. [2] The relationship between CTG findings and NICU admission were noted. 22 babies had NICU admission in the abnormal CTG findings group and 35 babies had NICU admission among those having a suspicious CTG trace. P – value for the above association was 0.247 which was not statistically significant.

In this study, NICU admission rate was high, which is comparable to study done by Singh et.al. [1] But there was no statistically significant association noted between CTG findings and NICU admission showed no statistical significance.

Also, there was no statistically significant association noted between CTG findings and low APGAR score at 1 minute or 5 minutes after birth. This study of 94 patients who were of low risk, revealed no statistically significant association between the abnormal CTG findings and perinatal outcome with respect to NICU admission and APGAR score at 1 minute and 5 minutes after birth.

A study with a larger sample size and with inclusion of neonatal follow up till discharge for evaluating outcome and inclusion of other modalities of intrapartum fetal monitoring can help obtain statistically significant association. [5]

Conclusion

A reassuring CTG strongly predicts a good outcome for the neonate and helps plan further labour management. [6] In this study, it was noted that abnormal CTG findings were associated with meconium-stained amniotic fluid, fetal distress, NICU admission of the newborns, and these associations were noted to be not statistically significant. To find a statistically significant correlation between these parameters, a larger sample size and addition of other modalities of intrapartum fetal monitoring will help overcome the limitations of the study.

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