



## TO STUDY THE RELATIONSHIP BETWEEN ANTENATAL CARDIOTOCOGRAPHY AND PERINATAL OUTCOME, MODE OF DELIVERY, MATERNAL COMORBIDITIES.

### Gynaecology

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### ABSTRACT

The primary goal of fetal monitoring is a healthy new born with a healthy mother. Cardiotocography as generally accepted, and is most widely used non-invasive method of monitoring fetal status. There is significant correlation between pathological CTG and the state of the newborn evaluated by Apgar score, the existence of acidosis, hypoxic-ischemic encephalopathy and subsequent neuromotor development.

**AIMS AND OBJECTIVES:** To evaluate the relationship between antenatal CTG and perinatal outcome, maternal comorbidities and mode of delivery.

**MATERIAL AND METHODS:** This prospective observational study in which 300 women with gestational age of 37-42 weeks with singleton pregnancy with or without any comorbidity were included after written consent. Women included in the study underwent CTG at the time of admission and during labour. The cardiotocogram was interpreted as per FIGO guidelines and were allocated the three categories. The need for neonatal intensive care unit (NICU) admission and maternal comorbidities were correlated with the type of CTG record.

**STATISTICAL ANALYSIS :** Relationship between antenatal CTG and APGAR score and perinatal outcome were analyzed using Kniskallwallis test. Two tailed p-values was reported and a p-value <0.05 was taken as statistically significant.

**RESULTS :** Majority of patients i.e. 197 (65.7%) belonged to the age group of 30-34 years. Patients were divided into three categories. 109 (36.3%) patients fall in category I, 107 (35.6%) in category II, and, 84 (28%) in category III. When correlated with CTG maternal comorbidity was seen in 39 (35.8%) patients in Category I, 50 (46.7%) patients in Category II and 45 (53.6%) in Category III. Neonatal intensive care unit (NICU) admission was needed in 67 (22.3%) patients. When CTG was correlated with NICU admission, 4 (3.7%), 15 (14%) and 48 (57.1%) in Category I, Category II and Category III needed NICU admission.

**CONCLUSION:** Cardiotocography (CTG) is a simple noninvasive test that can be used to detect fetal distress already present or likely to develop and prevent unnecessary delay in intervention. Thus it helps in preventing fetal morbidity and mortality. This test is simple, cost effective and can be utilized in heavy work load hospital/setups with limited resources. With the use of CTG in high risk cases timely intervention can be implied to reduce the perinatal mortality and morbidity.

### KEYWORDS

Cardiotocography, Apgar Score, Fetal Heart Rate, Pregnancy

#### INTRODUCTION:

The primary goal of fetal monitoring is a healthy new born with a healthy mother. There are several methods of antepartum and intrapartum fetal monitoring i.e. fetal movement assessment, periodic fetal heart rate (FHR) auscultation, continuous FHR monitoring, fetal biophysical profile, contraction stress test (CST), stimulation technique like scalp stimulation and vibroacoustic stimulation, amniotic fluid analysis, fetal blood evaluation and Doppler velocimetry<sup>1,2</sup>.

Advantage of cardiotocography as generally accepted, is most widely used non-invasive method of monitoring fetal status. There is significant correlation between pathological CTG and the state of the newborn evaluated by Apgar score<sup>3</sup>, the existence of acidosis<sup>4</sup>, hypoxic-ischemic encephalopathy<sup>5</sup> and subsequent neuromotor development<sup>6</sup>. Fetal asphyxia is a condition of disturbed gas exchange, leading to progressive hypoxemia and hypercapnia with significant metabolic acidosis. Asphyxic baby can die, recover, manifest hypoxic-ischemic encephalopathy (HIE), and later have neurodevelopmental disorders.<sup>7</sup> Cardiotocography is a method of prepartum and peripartum examination which has been established as the routine standard for foetal surveillance<sup>8</sup>. In spite of this fact, CTG will probably remain the screening method for the diagnosis of acute foetal hypoxia.<sup>9</sup> Surveillance of the foetus during labour is important to ensure the delivery of a healthy baby in good condition with minimum intervention<sup>10</sup>. Such an approach is introduced to prevent neurological injury, including cerebral palsy<sup>11</sup>. For this purpose, electronic foetal monitoring (EFM) has widely been adopted<sup>12</sup>.

Cardiotocography (CTG) is an electronic fetal monitoring which records fetal heart rate and uterine activity on a graph. CTG includes four parameters<sup>13,14</sup>

1. Foetal heart rate (normal: 110-160bpm)
2. Baseline variability (normal: 5-25bpm)

3. Acceleration (normal: 2 or more acceleration that peaks at 15bpm for 15 seconds above baseline within 20 minute of beginning of test)
4. Deceleration (none): Decelerations are periodic, transient decreases in FHR, usually associated with uterine contractions. They can be subdivided into four main types by their shape and timing in relation to uterine contractions.

The objective of this study was to evaluate the predictive value of the admission CTG in detecting foetal hypoxia at the time of admission in labour and to correlate the results of the admission CTG with the perinatal outcome in high-risk obstetric cases.

#### AIMS AND OBJECTIVES

1. To evaluate the correlation between antenatal CTG and perinatal outcome.
2. To assess the relationship between antenatal CTG and maternal comorbidities and mode of delivery.

#### MATERIAL AND METHODS

This prospective observational study was performed over a period of two years in which 300 women with gestational age of 37-42 weeks with singleton pregnancy with or without any comorbidity. This study was performed in the Postgraduate Department of Obstetrics and Gynecology, at LallaDed hospital, Srinagar after obtaining approval from institutional Ethical Clearance Committee and Written informed consent taken.

#### INCLUSION CRITERIA

1. Antenatal patients admitted in LD hospital with gestational age of 37-42 weeks with or without comorbidity.
2. Singleton pregnancy.

#### EXCLUSION CRITERIA

1. Antenatal patients with gestational age <37 weeks.

2. Twin pregnancy.

Women included in the study underwent CTG at the time of admission and during labour.

**CTG INTERPRETATION**

The cardiotocogram was interpreted as per FIGO guidelines and were allocated the following three categories:<sup>13,14</sup>

**CATEGORY 1**

- Baseline rate (110-160)
- Baseline FHR variability:- moderate
- Late or variable decelerations:- absent
- Early deceleration:- present or absent
- Acceleration:- present or absent

**CATEGORY 2**

Category 2 fetal heart rate includes all fetal heart rate tracing not categorized as category 1 or category 3.

**BASELINE RATE:-**

- 1) Bradycardia not accompanied by absent baseline variability.
- 2) Tachycardia

**VARIABILITY**

- 1) Minimum baseline variability.
- 2) Absent baseline variability with no recurrent deceleration.
- 3) Marked baseline variability.

**ACCELERATION**

- 1) Absence of induced acceleration after fetal stimulation.
- 2) Recurrent variable deceleration accompanied by min or moderate baseline variability.
- 3) Prolonged deceleration more than 2 minutes but less than 10 min.
- 4) Recurrent deceleration with moderate baseline variability.

**CATEGORY 3**

It includes FHR tracing

- 1) Absent baseline FHR variability and any of the following
  - a) recurrent late decelerations
  - b) recurrent variable decelerations
  - c) bradycardia
- 2) Sinusoidal pattern

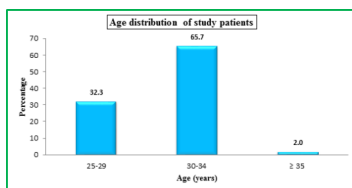
Afgar score was calculated at birth, 1 and 5 minutes and correlated with CTG category. The need for neonatal intensive care unit (NICU) admission were also correlated with the type of CTG record. Relationship between CTG and maternal comorbidities also studied.

**STATISTICAL ANALYSIS**

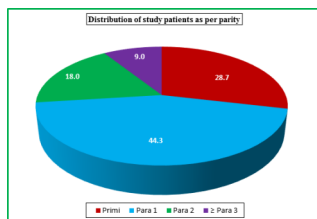
Continuous variables were summarized as mean and standard deviation. Categorical variables were summarized as frequency and percentage. Relationship between antenatal CTG and APGAR at birth, 1 min and 5 min were analyzed using Kniskallwallis test. Two tailed p-values was reported and a p-value <0.05 was taken as statistically significant.

**OBSERVATIONS AND RESULTS:**

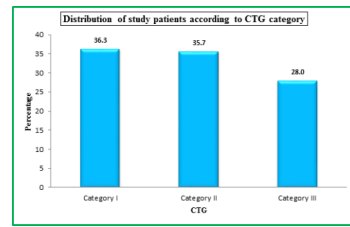
**FIGURE:1**



**Figure:2**



**Figure:3**



**Table 1: Correlation of CTG with mode of delivery in study patients**

Mode of delivery	Category I	Category II	Category III
NVD	66.1	28	3.6
LSCS	33.9	72	96.4

**Table 2: Correlation of CTG category with maternal comorbidities in study patients**

Maternal Comorbidity	Category I		Category II		Category III	
	No.	%age	No.	%age	No.	%age
Present	39	35.8	50	46.7	45	53.6
Absent	70	64.2	57	53.3	39	46.4
Total	109	100	107	100	84	100

Chi-square=6.36; P-value=0.042\*

**Table 3: Correlation of CTG category with NICU admission**

NICU Admission	Category I		Category II		Category III	
	No.	%age	No.	%age	No.	%age
Yes	4	3.7	15	14.0	48	57.1
No	105	96.3	92	86.0	36	42.9
Total	109	100	107	100	84	100

Chi-square=84.83; P-value<0.001\*

**DISCUSSION**

This prospective observational study was performed over a period of two years in which 300 women with gestational age of 37-42 weeks with singleton pregnancy with or without any comorbidity were included.

In our study, majority of patients i.e. 197 (65.7%) belonged to the age group of 30-34 years, followed by 97 (32.5%) patients of 25-29 years of age. In our study, majority of cases i.e. 91 (30.2%) had gestational age of 40 weeks, followed by 39 weeks, 41 weeks, 38 weeks, 37 weeks and 42 weeks. The mean gestational age observed was 39.5 years. In our study, pregnancy induced hypertension (PIH) was the comorbidity in majority of our patients (91, 30.33%), followed by gestational diabetes mellitus (GDM) in 43 (14.33%). When correlated with CTG maternal comorbidity was seen in 39 (35.8%) patients in Category I, 50 (46.7%) patients in Category II and 45 (53.6%) in Category III. In our study patients were divided into three categories. 109 (36.3%) patients fall in category I, 107 (35.6%) in category II, and, 84 (28%) in category III. Our results are consistent with the findings of Bhartiya V (2016)<sup>15</sup> in which 60% of the traces belonged to non-reassuring pattern, 37% belonged to reassuring, and 3% were abnormal.

In our study a total of 300 women were included in which 195 (65%) delivered via lower segment caesarean section (LSCS) while as normal vaginal delivery was achieved in 105 (35%) women. In our study among patients in CTG category I, 66.1% delivered vaginally and 33.9% women delivered by caesarean section. 28% patients in CTG category II delivered vaginally and 72 through caesarean section. 3.6% women in CTG category III delivered vaginally while as 96.4% delivered by caesarean section. In our study, the apgar score at birth was 1-3 in 112 (37.3%) patients, followed by 4-6 in 96 (32%) patients and ≥ 7 in 92 (30.7%) patients. At 1 minute apgar score was 1-3 in 52 (17.3%), 4-6 in 125 (41.7%) patients and ≥ 7 in 123 (41%) patients. At 5 minute apgar score was 1-3 in 20 (6.7%), 4-6 in 64 (21.3%) patients and ≥ 7 in 216 (72%) patients. A study conducted by Perveen S et al, (2014)<sup>16</sup> found that fetal outcome in terms of 1 min Apgar score was 54% of neonates had Apgar score of <7 and 46% had >7 Apgar score.

In our study, neonatal intensive care unit (NICU) admission was needed in 67 (22.3%) patients. Among 200 neonates, 38 (19%) had NICU admission in a study conducted by Bhartiya V et al (2016)<sup>15</sup> which is almost consistent with the findings of our study. When CTG was correlated with NICU admission, 4 (3.7%), 15 (14%) and 48

(57.1%) in Category I, Category II and Category III needed NICU admission. Kumari VR et al (2015)<sup>17</sup> conducted a study in which a total of 7+14 babies were identified as presumed foetal compromise as evidenced by Category 2 and Category 3. Among them only 6 newborns needed NICU admission. Out of 50 cases with any of the CTG abnormality, 16 neonates had APGAR score <7 at 1 min, 7 had APGAR score < 9 at 5 min, 7 neonates had NICU requirement, all 34 had instrumental/ LSCS delivery in a study conducted by Sunitha C et al (2017)<sup>18</sup>.

### CONCLUSION:

Cardiotocography (CTG) is a simple noninvasive test that can be used to detect fetal distress already present or likely to develop and prevent unnecessary delay in intervention. Thus it helps in preventing fetal morbidity and mortality. This test is simple, cost effective and can be utilized in heavy work load hospital/setups with limited resources. With the use of CTG in high risk cases timely intervention can be implied to reduce the perinatal mortality and morbidity.

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