<u>**Original Research Article**</u>

Role of Extended CTG in Fetal Distress

Ruqiya Rashid[1], Khushbu Bashir[2]

[1,2]Department of Obstetrics and Gynecology SKIMS Srinagar Jammu & Kashmir

Abstract:

Background: Fetal distress is defined as progressive fetal hypoxia and/or acidemia secondary to inadequate fetal oxygenation. Fetal distress can be observed through electronic fetal heart rate monitoring. Fetal heart rate monitoring during labor and delivery is important to assess the fetal wellbeing and to predict the outcome.

Material and methods: The present prospective observational study was conducted in the Postgraduate Department of Obstetrics and Gynaecology, SKIMS Srinagar Jammu and Kashmir over a period of 2 years and total of 165 patients were enrolled in the study. Intrapartum CTG tracings were taken and classified into Normal, Suspicious and Pathological trace. Patients having suspicious and abnormal CTG tracings were subjected to extended trace of CTG to detect the fetal distress.

Results: 165 patients were enrolled in the study aged between 20 to 40 years with a mean age of 29.3 ± 4.01 years. Majority of patients i.e. 69 (42.1%) were between age group of 31-35 years followed by 54 (32.3%) patients who were between 26-30 years. 24 (14.3%) patients were between 20-25 years of age group while 18(11.3%) patients were 36-40 years of age. 49 (29.6%) cases had MSL while 116 (70.3%) cases did not. Out of the 49 cases with MSL, 29 (59%) cases had a normal trace, 10 (20.4%) cases had a pathological trace and 10 (20.4%) cases had a suspicious trace. Out of the 116 cases without MSL, 02 cases (1.7%) had a Pathological trace and 14 cases (12%) had a suspicious trace. 35 patients out of 165 required NICU admission and out of 35 patients 8(22.8%) had normal, 11(31.4%) patients had pathological and 16 patient (45.7%) had suspicious CTG. 130 patients did not required NICU admission. Out of 130 patients, 121(93%) patients had normal, 01 (0.8%) had pathological and 08(6.1%) patients had suspicious CTG trace**.**

Conclusion: Abnormal CTG is important for both obstetrician's and pediatrician's point of view. Abnormal extended trace of CTG is a good predictor of the presence of MSL, apgar score at 1 and 5 minutes and NICU admission. If extended CTG is done and is interpreted properly, the fetal distress can be diagnosed earlier at which less damage has occurred to the baby and hence NICU admissions can be prevented.

Keywords: fetal distress, cardiotocography, meconium-stained liquor (MSL), apgar score, NICU admission.

Introduction

Fetal distress is defined as progressive fetal hypoxia and/or acidemia secondary to inadequate fetal oxygenation [3]. Fetal distress can be observed through electronic fetal heart rate monitoring [4,5,6]. Fetal heart rate monitoring during labor and delivery is important to assess the fetal wellbeing and to predict the outcome. The two most common methods of monitoring fetal heart rate are cardiotocography (CTG) and intermittent auscultation. Routine electronic monitoring of fetal heart rate (FHR) in labor has become an established obstetric practice in developed countries.[4] On the other hand in developing countries like ours where there are busy labour rooms, economic constraints and few monitors available, the routine electronic fetal monitoring is not possible. The CTG is commonly used non-invasive tool for predicting fetal distress in labour. Cardiotocography records changes in the fetal heart rate and their temporal relationship to uterine contractions. In addition to estimating the basal heart rate, it also assesses other parameters like variability, accelerations and decelerations of fetal heart rate [2].

CTG has now become a very popular tool in labour wards. Despite its popularity, it has not been proved to be an ideal tool for monitoring as, although a normal trace is indicative of a normal acid-base status at birth, in about 98% of cases, an abnormal trace has a low positive predictive value in term of fetal acidosis [3].

Aims and Objectives

To assess the role of extended CTG in fetal distress

Material and Methods

The present prospective observational study was conducted in the Postgraduate Department of Obstetrics and Gynaecology, SKIMS Srinagar

Jammu and Kashmir over a period of 2 years and total of 165 patients were enrolled in study. Patients included in the study were all term (> 37 weeks) singleton pregnancies with vertex presentation in active phase of labour with documented suspicious/pathological CTG.

All high-risk pregnancies (anemia, hypertension, thyroid disorders, diabetes, epilepsy, asthma, teenage, elderly), intrauterine growth restriction, oligohydramnios, preterm deliveries, multiple gestation, malpresentations, abruptio placenta, fetus with congenital anomalies, maternal infections and premature rupture of membranes and patients not giving consent were excluded from the study.

All patients in active phase of labour admitted to labour room were subjected to history, general physical examination, abdominal and vaginal examination, followed by ultrasonography. Intrapartum CTG tracings were taken and classified into Normal, Suspicious and Pathological trace according to the NICE 2017 guidelines[8]. Patients having suspicious and abnormal CTG tracings were subjected to extended trace of CTG to detect the fetal distress.

Statistical Analysis

Sample size for the study was calculated as:

$n = Z^2 \times (p) \times (1-p)/\Delta^2$

Where n is the sample size,

Z is confidence interval i.e., 1.96 for 95% Δ is confidence level i.e., 0.05 for ±5% p=prevalence of the event in the population as determined by previous studies.

Taking incidence of fetal distress in term singleton pregnancies as per previous studies as 12.2% sample size for my study is calculated to be:

$n = (1.96)^2 \times (0.122) \times (1-0.122)/ (0.05)^2 = 165$

Data was analyzed and statistically evaluated using SPSSPC-20 version. A P value of <0.05 was considered as the definition of statistical significance.
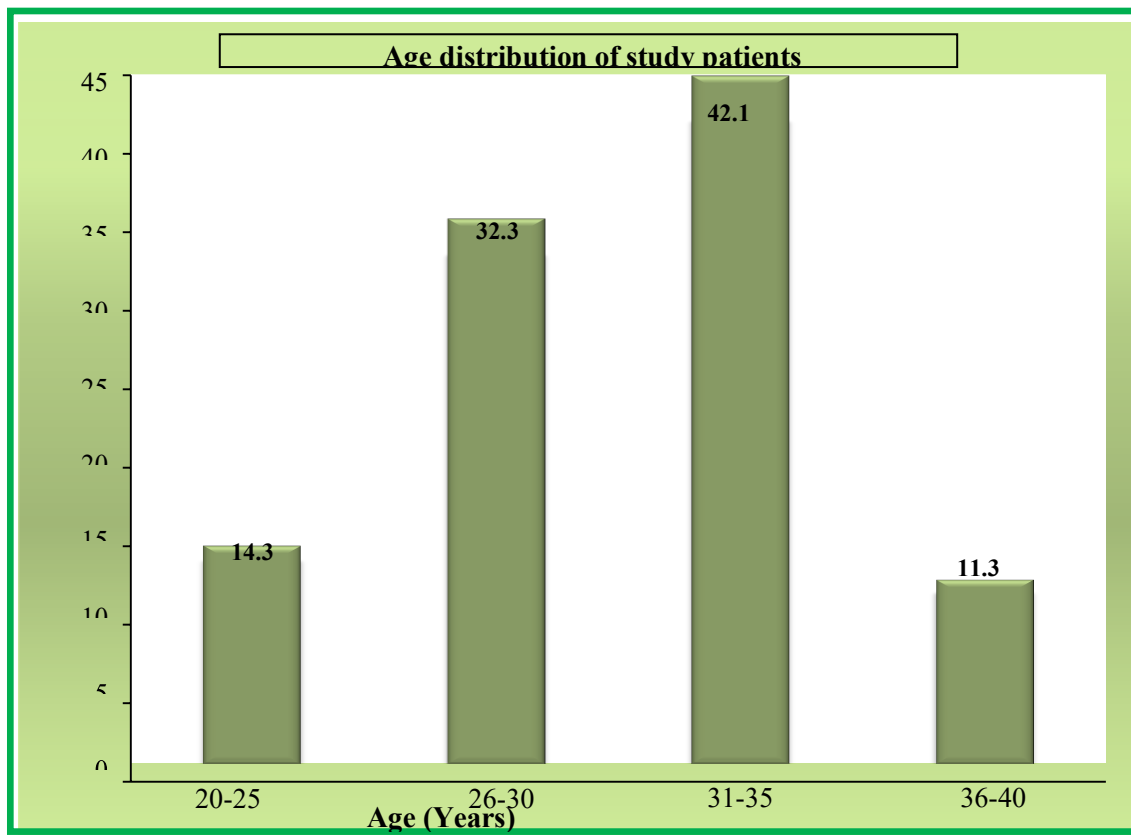
Results and Analysis

Figure 1: Age distribution of study patients
165 patients were enrolled in the study aged between 20 to 40 years with a mean age of 29.3+4.01 years. Majority of patients i.e , 69 (42.1%) were age group of 31-35 years followed between by 54 (32.3%) patients who were between 26-30 years. 24 (14.3%) patients were between 20-25 years of age group while 18(11.3%) patients were 36-40 years of age.

Table 1: Parity distribution of study patients

Parity	Number	Percentage
Primi	110	66.6
Multi	55	33.3
Total	165	100

Table 1 shows 110(66.6%) women were primigravidae and 55 (33.3%) were multigravida. Majority of patients i.e. 128 (78%) having gestational age of > 37. Gestational age of the patients ranged between 35-40 weeks.

Table 2: Onset of labour among study patients

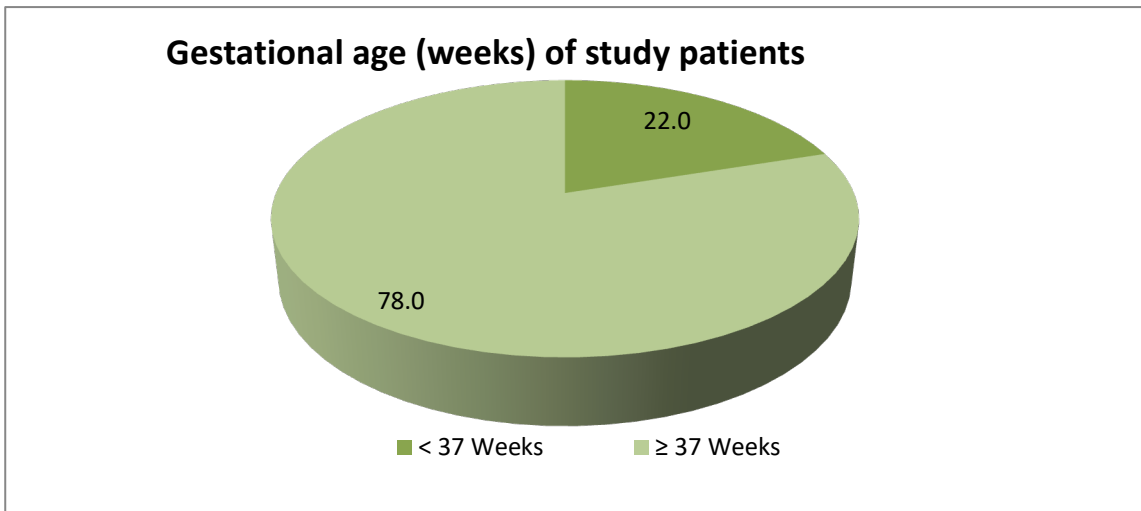| Onset of labour	Number	Percentage
Spontaneous	123	74.5
Induced	42	25.5
Total	165	100

Figure 2: Gestational age (weeks) of study patients

Table 2 shows that out of 165 patients, 123(74.5%) patients had spontaneous onset of labour and the rest 42 (25.5%) patients had induced labour.

Table 3: Type of extended CTG

Type of extended CTG	Number	Percentage
Normal	129	78.2
Suspicious	24	14.6
Pathological	12	7.2

Table 3 shows that maximum 129(78.2%) patients had normal trace, 24(14.6%) had suspicious trace, and where as 12 patients (7.2%) had pathological trace.
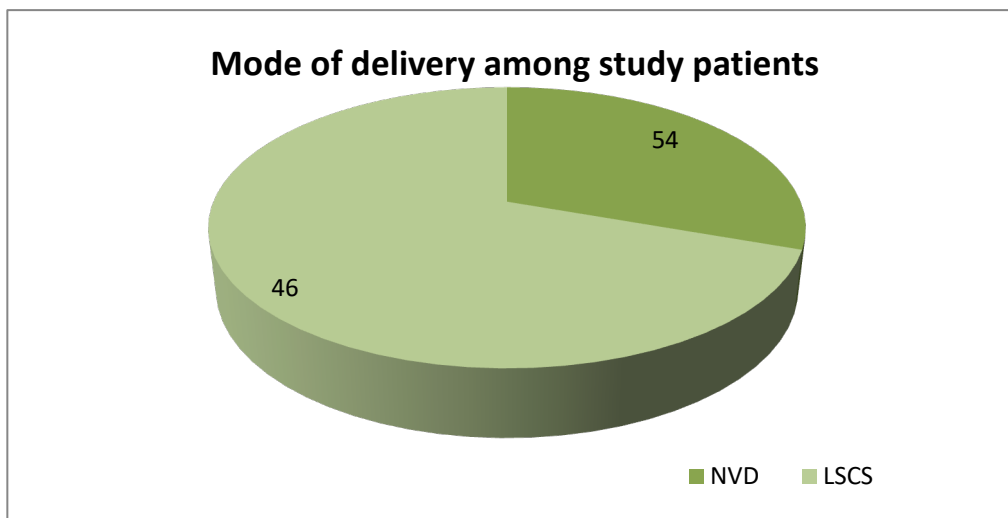

Figure 3: Mode of delivery among study patients

75 (46%) delivered by lower segment caesarean section while as 90 (54%) patients delivered by normal vaginal delivery.

Table 4: Relationship between extended CTG trace and meconium in liquor

Meconium	Total Cases	CTG Category			p value
		Normal	Pathological	Suspicious	
		Frequency (%)	Frequency (%)	Frequency (%)	
Absent	116	100(86.2%)	02(1.7%)	14 (12%)	<0.001 – significant
Present	49	29 (59%)	10(20.4%)	10(20.4%)	
Total	165	129 (78.2%)	12 (7.2%)	24 (14.6%)	

49 (29.6%) cases had MSL while 116 (70.3%) cases did not. Out of the 49 cases with MSL, 29 (59%) cases had a normal trace, 10 (20.4%) cases had a pathological trace and 10 (20.4%) cases had a suspicious trace. Out of the 116 cases without MSL, 02 cases (1.7%) had a Pathological trace and 14 cases (12%) had a suspicious trace.
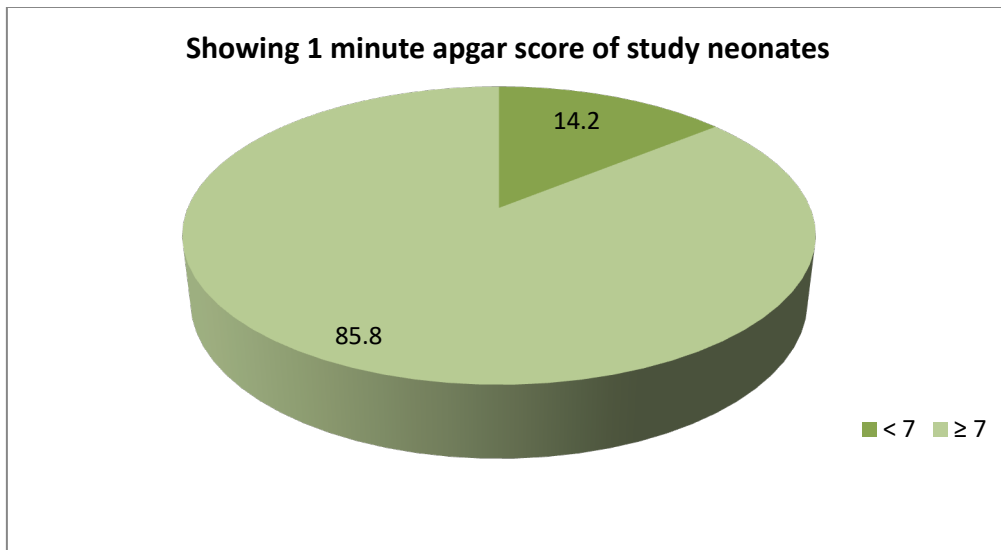

Figure 4: Showing 1 minute apgar score of study neonates

Apgar score at 1 minute was <7 in 34 (14.2%) neonates and >7 in 206 (85.8%) neonates with a mean Apgar score of 7.4+1.09 (range 3-8).
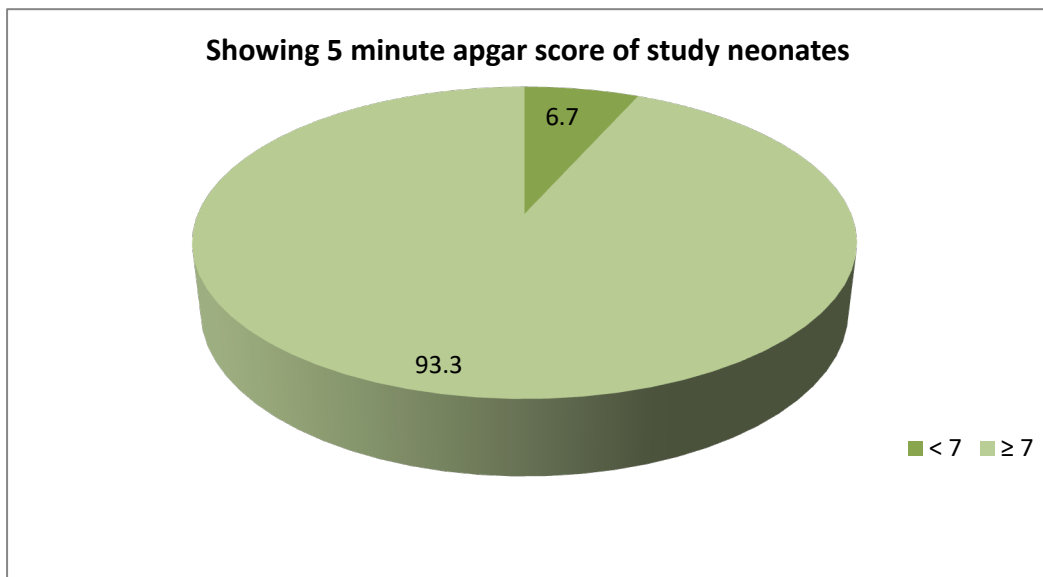

Figure 5:

Apgar score at 5 minute was <7 in 16 (6.7%) neonates and >7 in 224 (93.3%) neonates with a mean Apgar score of 8.2+1.25 (range 3-9).

Table 5: Relationship between extended CTG and NICU admission

NICU Stay	Total Cases	CTG Category		
		Normal	Pathological	Suspicious
		Frequency (%)	Frequency (%)	Frequency (%)
No	130	121(93%)	01 (0.8%)	08(6.1%)
Yes	35	8 (22.8%)	11(31.4%)	16(45.7%)
Total	165	129 (78.2%)	12 (7.2%)	24 (14.6%)

Table 5 shows 35 patients out of 165 required NICU admission and out of 35 patients 8(22.8%) had normal, 11(31.4%) patients had pathological and 16 patient (45.7%) had suspicious CTG. 130 patients did not required NICU admission. Out of 130 patients, 121(93%) patients had normal, 01 (0.8%) had pathological and 08(6.1%) patients had suspicious CTG trace.

Discussion

165 patients were enrolled in the study aged between 20 to 40 years with a mean age of 29.3+4.01 years. Majority of patients i.e, 69 (42.1%) were between age group of 31-35 years followed by 54 (32.3%) patients who were between 26-30 years. 24 (14.3%) patients were between 20-25 years of age group while 18(11.3%) patients were 36-40 years of age. 110(66.6%) women were primigravidae and 55 (33.3%) were multigravida. Majority of patients i.e, 128 (78%) having gestational age of > 37 weeks. Gestational age of the patients ranged between 35-40 weeks. Out of 165 patients, 123(74.5%) patients had spontaneous onset of labour and the rest 42 (25.5%) patients had induced labour. Maximum 129(78.2%) patients had normal trace, 24(14.6%) had suspicious trace, and where as 12 patients (7.2%) had pathological trace. 75 (46%) delivered by lower segment caesarean section while as 90 (54 %%) patients delivered by normal vaginal delivery. Panicker S (2008)65 studied 104 patients in which majority 43.3% (n=45) delivered through lower segment caesarean section, 36.5% (n=38) had delivered with episiotomy, 12.5% (n=13) had vacuum assisted delivery while forceps delivery was seen in 7.7% (n=8).This shows extended trace of CTG can reduce the cesarean section rates if done properly and interpreted carefully. 49 (29.6%) cases had MSL while 116 (70.3%) cases did not. Out of the 49 cases with MSL, 29 (59%) cases had a normal trace, 10 (20.4%) cases had a pathological trace and 10 (20.4%) cases had a suspicious trace. Out of the 116 cases without MSL, 02 cases (1.7%) had a Pathological trace and 14 cases (12%) had a suspicious trace. Sunitha C et al. [11] on 100 women, 4% of normal traces had the presence of meconium stained liquor and 44% of abnormal traces had the presence of meconium stained liquor. Similar to our study, they found a positive correlation between the presences of MSL with CTG category. Apgar score at 1 minute was <7 in 34 (14.2%) neonates and >7 in 206 (85.8%)

neonates with a mean Apgar score of 7.4+1.09 (range 3-8). Apgar score at 5 minute was <7 in 16 (6.7%) neonates and >7 in 224 (93.3%) neonates with a mean Apgar score of 8.2+1.25 (range 3-9). In the study by Agrawal SK et al. [14], the mean Apgar scores at 1 minute were 7.5± 0.6 for normal category CTG and 7.6± 0.3 for abnormal category CTG. The 5-min Apgar score was 8.8± 0.2 and 8.7± 0.2 respectively. Their result showed no significant correlation between CTG category and Apgar score but our study showed positive correlation between apgar score and CTG category. 35 patients out of 165 required NICU admission and out of 35 patients 8(22.8%) had normal, 11(31.4%) patients had pathological and 16 patient (45.7%) had suspicious CTG. 130 patients did not required NICU admission. Out of 130 patients, 121(93%) patients had normal, 01 (0.8%) had pathological and 08(6.1%) patients had suspicious CTG trace, so it shows positive correlation between CTG score and NICU admission. This is in contrast to the study conducted by W M Aboulghar et al. [13] showed no statistical association between the CTG categories and need for NICU stay. In their study, 33.3% of cases with pathological traces required NICU admission and 23.1% of those with a suspicious trace required NICU admission.

Conclusion

Abnormal CTG is important for both obstetrician's and pediatrician's point of view. Abnormal extended trace of CTG is a good predictor of the presence of MSL, apgar score at 1 and 5 minutes and NICU admission. If extended CTG is done and is interpreted properly, the fetal distress can be diagnosed earlier at which less damage has occurred to the baby and hence NICU admissions can be prevented.

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