

**Original Research Article****To compare intrapartum cardiographic (CTG) recording with conventional intermittent fetal heart auscultation during labor**Isha Bansal<sup>1</sup>, Richa Kansal<sup>2</sup>, R.Mahendru<sup>3</sup>, Sunita Siwach<sup>4</sup>, Deepak Singla<sup>5</sup>, Manjeet Singh<sup>6</sup><sup>1</sup>Lecturer, Department of Obst & Gynae, BPS Govt. Medical college for women, Khanpur Kalan, Sonapat, Haryana, India<sup>2</sup>Asso. Prof, BPS Govt. Medical college for women, Khanpur Kalan, Sonapat, Haryana, India<sup>3</sup>Professor, BPS Govt. Medical college for women, Khanpur Kalan, Sonapat, Haryana, India<sup>4</sup>Asst. Prof., Department of Obst & Gynae, BPS Govt. Medical college for women, Khanpur Kalan, Sonapat, Haryana, India<sup>5</sup>Senior resident, Department of surgery, BPS Govt. Medical college for women, Khanpur Kalan, Sonapat, Haryana, India<sup>6</sup>Asst. Prof., Department of Physiology, BPS Govt. Medical college for women, Khanpur Kalan, Sonapat, Haryana, India**ARTICLE INFO:****Article history:**

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**ABSTRACT**

Standard evaluation of fetal well-being during labor includes the periodic assessment of the fetal heart rate (FHR), its pattern and response to intrapartum stimuli and events. Effective methods of evaluation and meaningful interpretation of FHR data range from non-invasive techniques like Intermittent Auscultation, continuous electronic fetal heart rate (FHR) monitoring to invasive techniques of fetal blood gas analysis and fetal ECG.

**Introduction**

Obstetricians are concerned with early recognition of fetal distress during labor in order to avoid an adverse outcome. Although, the vast majority of fetuses cope well during labor, the journey through the birth canal is stressful and fetuses mount a 'stress response' during labor. Fetal monitoring during labor should identify the fetuses at risk of hypoxic damage, so that appropriate intervention could be instituted to optimise perinatal outcome. It is important to distinguish a fetus that exhibits a stress-response to labor, from the one that shows a distress or hypoxic response. Failure to do so increases unnecessary intervention in the former, while increasing the morbidity and mortality in the latter.

Standard evaluation of fetal well-being during labor includes the periodic assessment of the fetal heart rate (FHR), its pattern, and response to intrapartum stimuli and events. Effective methods of evaluation and meaningful interpretation of FHR data range from non-invasive techniques like

Intermittent Auscultation, continuous electronic fetal heart rate (FHR) monitoring to invasive techniques of fetal blood gas analysis and fetal ECG.

Intermittent Auscultation is a method of fetal surveillance that utilizes listening and counting the FHR for a specified period of time at specified intervals in relation to uterine contractions[1].

The cardiographic (CTG), also known as Electronic Fetal Heart Rate Monitoring (EFM), is a continuous electronic record of the fetal heart rate obtained via an ultrasound transducer placed on the mother's abdomen.

The routine use of antenatal EFM for fetal assessment in women with an uncomplicated pregnancy has led to an increase in caesarean delivery and instrumental vaginal births; however, the incidences of neonatal mortality and cerebral palsy have not fallen, and a decrease in neonatal seizures is the only demonstrable benefit [2].

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Continuous EFM during labor is associated with a reduction in neonatal seizures, but no significant differences in cerebral palsy, infant mortality or other standard measures of neonatal well-being. However, continuous EFM was associated with an increase in caesarean sections and instrumental vaginal births. In current obstetric practice, additional tests of fetal well-being like fetal blood sampling (FBS), fetal ECG, fetal pulse

**Material and methods**

The present study was conducted on 100 cases of pregnancy ≥37 weeks in labor presenting to the Labor Room of Obstetrics and Gynaecology Department of our rural tertiary care centre. Patients were selected after excluding patients with preterm labor, IUGR fetuses, PIH, malpresentations,, multiple gestation, antepartum Haemorrhage, scarred uterus, fibroid uterus or developmental uterine anomaly, morbid obesity and were then divided into two groups randomly, A and B, each comprising of 50 patients who were monitored by Continuous EFM and Intermittent auscultation respectively.

At the time of presentation, a detailed history, examination and routine investigations were done. These were recorded on a predesigned proforma. The procedure was explained to the patient and written consent was taken.

oximetry and fetal scalp blood lactate levels are employed to reduce the false positive rate of the CTG. Such an approach is likely to increase our ability to identify hypoxic fetuses, that actually need an intervention and to avoid unnecessary intervention to those fetuses, which are not subjected to a hypoxic insult.

In group A, there were 50 patients who were monitored by Cardiotocography. All the recordings were made on a recording graph paper.

The patient was placed in supine position with slight left lateral tilt to avoid supine hypotension. Generous amount of jelly was applied to the contact surface of probe and fixed with a belt on mother’s abdomen at the area of maximum intensity of FHS to record FHR. The 2nd probe was placed over uterine fundus to record uterine contractions. Then the recording on the graph paper was started.

There are four features that should be noted while interpreting a CTG trace. These are baseline fetal heart rate (FHR), baseline variability and the presence of accelerations and decelerations.

The individual features of the CTG mentioned above, should be categorized into ‘re-assuring’, ‘non-reassuring’ and ‘abnormal’.

**Table 1: Categorisation of Components of CTG[3]**

Feature	Baseline	Variability	Decelerations	Accelerations
<b>Reassuring</b>	110-160 bpm	≥5bpm	None	Present
<b>Non-Reassuring</b>	<ul style="list-style-type: none"> <li>• 100-109 bpm</li> <li>• 161-180 bpm</li> </ul>	<ul style="list-style-type: none"> <li>• &lt;5bpm for ≥40min but less than 90min</li> </ul>	<ul style="list-style-type: none"> <li>• Early deceleration.</li> <li>• Variable deceleration.</li> <li>• Single prolonged deceleration upto 3min.</li> </ul>	
<b>Abnormal</b>	<ul style="list-style-type: none"> <li>• &lt;100bpm</li> <li>• &gt;180bpm</li> <li>• Sinusoidal pattern ≥10min</li> </ul>	<ul style="list-style-type: none"> <li>• &lt;5bpm for ≥90min</li> </ul>	<ul style="list-style-type: none"> <li>• Atypical variable deceleration</li> <li>• Late deceleration</li> <li>• Single prolonged deceleration &gt;3min</li> </ul>	

This should be followed by the classification of the CTG into ‘normal’, ‘suspicious’ or ‘pathological’.

**Table 2: Categorisation of FHR Patterns [4]**

Category	Definition
<b>Normal</b>	CTG where all 4 features fall into reassuring category
<b>Suspicious</b>	CTG where 1 of the features fall into non-reassuring category & the remainder of the features are reassuring
<b>Pathological</b>	CTG where 2 or more features fall into non-reassuring category & 1 or more features fall into abnormal category

The graph was studied and analysed and then recordings were categorized into reassuring and non-reassuring patterns. In case of non-reassuring pattern, patient was dealt according to the P/V findings and clinical condition at that time.

In group B, there were 50 patients who were monitored by Intermittent Auscultation. FHR was auscultated with the bell of the stethoscope every 30 minutes in the first stage and every 5 minutes in the second stage of labor. It was auscultated for full one minute in between the contractions to note the

baseline FHR. Fetal heart was also auscultated before, during and after the contraction in order to assess any periodic change in FHR[5].

Category I FHR characteristics (normal and are predictive of fetal well-being when observed) by auscultation include all of the following:

- Normal FHR baseline between 110 and 160 beats per minute
- Regular rhythm
- Presence of FHR increases or accelerations from the baseline
- Absence of FHR decreases or decelerations from the baseline

Category II FHR characteristics (not normal or not included in Category I) by auscultation include any of the following:

- Irregular rhythm
- Presence of FHR decreases or decelerations from the baseline
- Tachycardia (baseline >160 bpm, >10 minutes in duration)
- Bradycardia (baseline <110 bpm, >10 minutes in duration)

These FHR characteristics may be either indeterminate or abnormal depending on the FHR variability that is present which cannot be determined via Intermittent Auscultation.. In both groups, complete record of the mode of delivery was made. Apgar score of the baby and its weight was recorded

and followed up for any neonatal complications. The results of the two groups were studied, compared and statistically analysed in reference to obstetric and fetal outcome.

### Result and Discussion

In the CTG group, age of the patients varied from 19 years to 32 years with a mean of 24.76 years. In the Intermittent Auscultation group, age of the patients varied from 20 years to 38 years with a mean of 24.7 years. Thus, the 2 groups were comparable.

In the CTG group, 58% patients had parity 0 and 42% patients had parity  $\geq 1$ . In the Intermittent Auscultation group, 60% patients had parity 0 and 40% patients had parity  $\geq 1$ . Thus the two groups were comparable.

Out of the total 50 patients monitored by CTG, 43 patients (86%) had normal FHR tracings and 7 patients(14%) had abnormal FHR tracings out of which 3 patients (42.85%) had late deceleration , , 2 (28.57%) patients showed bradycardia, while 1 (14.29%) patient each showed tachycardia and .variable deceleration.

Out of the total 50 patients monitored by Intermittent Auscultation,36 patients (72%) had normal FHR findings while abnormal FHR was seen in 14 patients (28%) out of which 8 (57.14%) patients had irregular FHR, 5 (35.71%) patients had bradycardia. and 1 (7.15%) patient had tachycardia as FHR abnormality.

**Table 3: FHR ABNORMALITY DETECTED**

	CTG	Intermittent Auscultation
Westgren <i>et al</i> [6] (1980)	10%	NA
Vintzileos <i>et al</i> [7] (1993)	23.4%	10.7%
Herbst and Ingemarsson [8] (1994)	6.6%	6.3%
Present study	14%	28%

In the present study, 14 % patients in CTG group, and 28% patients in Intermittent Auscultation group had FHR abnormality. The difference might be due to subjective variation in determining FHR abnormality by Intermittent Auscultation.

Null hypothesis was formulated that there is no difference in FHR abnormality between the CTG group and Intermittent Auscultation group. Chi-square test was applied and p value came out to be 0.027, p value <0.05. So, Null hypothesis was rejected. Thus there is a statistically significant difference in

FHR abnormality between the CTG group and Intermittent Auscultation group.

In the CTG group, out of 7 patients in whom FHR abnormality was detected, in 3 patients late decelerations were observed and in 1 patient variable deceleration was seen. In 2 patients, FHR findings showed bradycardia, while in 1 patient, tachycardia was observed. Meconium stained liquor was seen in 1 patient with late deceleration, 1 patient with bradycardia and 1 patient with tachycardia.

In the Intermittent Auscultation group, out of 14 patients in whom FHR abnormality was observed, 8 patients had irregular FHR In which 5 patients had bradycardia and 1 patient had

### Conclusion

There is evidence that women with continuous EFM were more likely to have an instrumental birth (RR 1.1 [95% CI 1.0 to 1.3]) and caesarean section (RR 1.2 [95% CI 1.0 to 1.4]), compared with the auscultation group, although there were no differences in augmentation rates (RR 1.1 [95% CI 0.9 to 1.2]), perinatal mortality (RR 1.1 [95% CI 0.2 to 7.1]) or other neonatal morbidities. It may have a role in obstetric units with a heavy workload (>10,000 deliveries/year) with limited resources to help in 'Triaging' fetuses.

Thus we conclude that CTG is a better tool to detect fetus in distress. It is more specific and sensitive method to decide obstetrical management. CTG can be continued as a good screening test of fetal surveillance but it is not the sole criteria to influence the management of high-risk pregnancies. Abnormal CTG should be supplemented with other test before intervention.

### Conflict of interest statement

We declare that we have no conflict of interest.

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