



# CARDIOTOCOGRAPHY; ROLE OF INTRAPARTUM CARDIOTOCOGRAPHY IN EVALUATING FETOMATERNAL OUTCOME

1. MBBS, MCPS, FCPS  
Professor & Head  
Department of Obs&Gyne  
Sheikh Zayed Medical Complex,  
Lahore.
2. MBBS, FCPS  
Assistant Professor  
Department of Obs&Gyne  
Sheikh Zayed Medical Complex,  
Lahore.
3. MBBS, FCPS  
Associate Professor  
Department of Obs&Gyne  
Sheikh Zayed Medical Complex,  
Lahore.

#### Correspondence Address:

Dr. M. Ikram  
House No. Izhar Villas, Wafaqi Colony  
New Campus, Lahore.  
unber\_ikram@hotmail.com

#### Article received on:

22/05/2017

#### Accepted for publication:

15/08/2018

#### Received after proof reading:

02/10/2018

Muhammad Ikram<sup>1</sup>, Amna Javed<sup>2</sup>, Shafqat Mukhtar<sup>3</sup>

**ABSTRACT... Introduction:** The cardiotocography (CTG) is more commonly known as electronic fetal monitoring (EFM). A cardiotocography measures the fetal heart and the frequency of uterine contractions. Using two separate disc shaped transducers. **Objectives:** The objective of this study is to co-relate the intrapartum cardiotocography monitoring with fetomaternal outcome. **Study Design:** Cross sectional analytical study. **Setting:** Department of Obstetrics and Gynaecology, Shaikh Zayed Hospital, Lahore, Pakistan. **Period:** From September 2012 to March 2013 (Six Months). **Patient & Method:** Total 60 patients (pregnant females) fulfilling the inclusion criteria were selected for this study, who were admitted in labour room in early and active labour. In group A normal CTG monitoring and in Group B women with abnormal CTG monitoring. Maternal outcomes in terms of mode of delivery and fetal outcome (APGAR Score, neonatal seizures, admission to nursery and time of neonatal discharge were seen). **Result:** The mean age in group A was 26.13+3.90 years and in group B was 26.53+4.17 years. The mean gestational age in group A was 38.40+1.50 weeks and in group B was 36.60+1.59 weeks. In group A, 25 (83.3%) women were delivered through spontaneous vaginal birth and 4(13.4%) women, who were delivered by caesarean section (for all indication except fetal distress), 1 (3.3%) woman by assisted vaginal birth (for all other indications). In group B there were 7(23.8%) women who delivered through spontaneous vaginal birth. 3(10%) women by assisted vaginal birth (for abnormal CTG monitoring) and 20(66.7%) women by caesarean section (for abnormal CTG). In group A, there were 7(23.3%) neonates who were admitted in nursery, while in group B, there were 19(63.3%) neonates, who were admitted in nursery. **Conclusion:** Intrapartum external fetal cardiotocography is not a single indicator of fetal distress. An increased caesarean section rate in babies with a pathological cardiotocography stresses on the need for additional tests to differentiate hypoxic fetuses from non-hypoxic.

**Key words:** Cardiotocography, Fetal Distress, Fetal Heart Rate, Fetal Outcome, Maternal Outcome.

**Article Citation:** Ikram M, Javed A, Mukhtar S. Cardiotocography; role of intrapartum cardiotocography in evaluating fetomaternal outcome. Professional Med J 2018; 25(10):1537-1545. DOI:10.29309/TPMJ/18.4067

## INTRODUCTION

The cardiotocography (CTG) is more commonly known as electronic fetal monitoring (EFM). A cardiotocography measures the fetal heart and the frequency of uterine contractions. Using two separate disc shaped transducers. An ultrasound transducer measures the fetal heart rate. The second transducer is pressure sensitive and measure the frequency of uterine contraction.<sup>1</sup>

Electronic fetal monitoring was introduced in the United Kingdom (UK) in early 1970's, subsequently the use of EFM increased rapidly<sup>2</sup>, in the belief that it would improve the detection of fetal hypoxemia and reduce cerebral palsy

and perinatal mortality, particularly in high risk pregnancies.<sup>3</sup>

Cardiotocography use Doppler Ultrasound to demonstrate a fetal heart rate which is not a true beat to beat fetal heart rate an average over three neighbouring beats, analyzed to give baseline fetal rate, baseline variability and periodic changes.<sup>4</sup> Evaluation of changes in fetal heart rate (FHR) patterns were expected to identify fetuses at risk for asphyxia and allow early and appropriate intervention before the development of intrapartum asphyxia.<sup>5</sup>

By the introduction of intrapartum electronic

fetal monitoring, intrapartum death has become a rare event, and neonatal morbidity as being manifested by neonatal seizures has also been reduced. Although most cases of fetal hypoxia are presented by abnormalities detected on electronic fetal monitoring, similar abnormalities are not uncommon in the cases that have normal outcome and misinterpretation of fetal heart traces is often a contributing factor in cases of asphyxiated neonates.<sup>6</sup>

Cardiotocography methods of fetal assessment are limited by a high false positive rate resulting in an unnecessary high operative deliveries for non reassuring fetal status.<sup>7</sup>

Despite technological development in ultrasound and electronic fetal monitors, there have been some deficiencies in their clinical application as a sensitive test of fetal surveillance.<sup>8</sup> However despite an association with increased caesarean section rate cardiotocography remains a main method for monitoring high risk pregnancies.<sup>8,9</sup>

Assessment of the fetus during labour is a challenging task. The rationale for monitoring the fetal heart rate is that the patterns are indirect markers of the fetal cardiac status and modularly responses to blood volume changes, acidemia, and hypoxemia. Since brain is responsible for modulating the heart rate. Virtually all obstetrical organizations advise monitoring the fetal heart rate during labour. This position is largely based upon the experience of experts and medico legal precedent, no trials comparing electronic fetal monitoring or intermittent auscultation versus no monitoring has been performed.<sup>10</sup>

Though electronic fetal monitoring has had little effect on long-term outcome, and clinical management of labour, on the basis of this technique concerns still rises. Moreover, some have claimed that the method results in an unnecessarily high rate of caesarean deliveries. Results of fetal blood sampling can aid the interpretation of the cardiotocogram, but blood sampling required setup, awareness of patient and expertise. Hence, there is interest in the development of new methods for intrapartum

fetal surveillance.

The normal CTG recording shows a baseline fetal heart rate 110-160 beat per minute. Baseline variability is visual inspection of the cardiotocography showing oscillations during approximately 2-6 times per minute. Acceleration is transient increase in fetal heart rate of 15 beat per minute or more and lasting 15 seconds or more. Deceleration shows transient episodes of fetal heart rate below the baseline level of more than 15 beat per minute lasting 15 seconds or more.<sup>11</sup>

The presence of a normal baseline, acceptable variability and two accelerations is considered to be normal. The predictability of fetal heart rate variability for evaluating the adverse fetal outcome reveals low sensitivity and low predictive value.<sup>12</sup>

The presence of acceleration has a good perinatal outcome in continuous fetal heart rate monitoring. More than 2 accelerations in 20 minutes has a sensitivity of 97% for an Apgar score at 5 minute.<sup>13</sup>

Fetal outcome with Apgar score less than 7 is related with cerebral palsies in later life. We can prevent it by close monitoring during labour and early intervention of detection of fetal hypoxia during labour.<sup>13</sup>

One of the weaknesses of continuous fetal heart rate monitoring is that it does not provide much quantitative information about the fetal condition. The abnormal fetal cardiotocography during labour has a limited predictive value regarding poor fetal outcome.<sup>14</sup> Thus, in same circumstances, relatively minor heart rate changes may be found in a profoundly hypoxic baby while sever abnormalities may occur when the baby is not even mildly affected.<sup>15</sup>

In cases born with pathological trace more than 50% babies may not show any evidence of fetal hypoxia.<sup>9</sup>

I am interested to evaluate the impact of intrapartum electronic fetal heart rate monitoring on neonatal and maternal outcomes. As cardiotocography

remains a good, non-expensive and non-invasive investigation for assessing fetal well-being in our setup.

## OBJECTIVE

The objective of this study is to correlate the intrapartum cardiography monitoring with fetomaternal outcome.

## OPERATIONAL DEFINITIONS

Role of cardiography will be seen by four features of fetal heart rate i.e. baseline (beat/minute), variability (beat/minute), deceleration and acceleration.

## MATERNAL OUTCOME

It is the mode of delivery in terms of:

- Spontaneous vaginal birth
- Assisted vaginal birth (vacuum/forceps)
- Caesarean section

## FETAL OUTCOME

It is the outcome of fetal after being delivery by any above mentioned modes;

- Apgar Score at 1 minute and 5 minutes
- Admission in nursery
- Time to neonatal discharge (days)
- Neonatal seizures within 72 hours of birth

## MATERIAL AND METHODS

### Setting

This study was conducted in the department of obstetrics and gynaecology, Shaikh Zayed Medical Complex, Lahore, Pakistan.

### Study Design

Cross sectional analytical study

### Sample Size

Sixty pregnant women who were admitted in labour ward in early or active labour. Selected in two group of 30 patients in each group A and group B on the basis of normal and abnormal cardiography.

### Duration with Dates

Sixth months from September 2012 to March 2013.

## Sampling Technique

Non-probability convenient sampling.

## Inclusion Criteria

1. Early or active labour
2. Gestational age > 36 weeks (confirmed by LMP/ ultrasound)

## Exclusion Criteria

1. Multiple gestations
2. Non-vertex presentation
3. Placenta previa
4. Abruptio placenta
5. Antepartum haemorrhage
6. Uterine anomaly
7. Fetal anomalies.

## Data Collection Procedure

Sixty pregnant women were taken from labour ward, department of Obstetrics and Gynaecology, Shaikh Zayed Medical Complex, Lahore, who fulfilled the inclusion criteria. They were monitored with CTG intermittently and in the interval between the traces fetal heart rate was monitored by Pinard's fetoscope. Whenever any feature of non-reassuring or abnormal fetal heart rate pattern appears, there after labour were monitored by continuous CTG and Cardiographic patterns were labeled as normal or abnormal accordingly.

Normal CTG was where all four features fall into reassuring category and abnormal was defined as either suspicious or pathological patterns, as defined by Royal College of Obstetricians and Gynaecologists. The use of electronic fetal monitoring London RCOG 2001.

These labouring women selected as two groups of 30 women in each group i.e group A and Group B. In group A women with normal CTG monitoring and in group B women with abnormal CTG patterns. Informed consent was taken from these women for being part of this study. No extra risk was involved in studying such women.

Baseline demographics (age, parity, and gestational age), clinical characteristics (general physical examination, abdominal examination, baseline investigations, labour record

(spontaneous, induced, meconium stained liquor, epidural analgesia, CTG monitoring) and birth weight was recorded.

Maternal outcome in terms of mode of delivery (spontaneous vaginal birth, assisted vaginal birth (vacuum/forceps), caesarean section and fetal outcome (Apgar Score, neonatal seizures, admission to nursery and time to neonatal discharge) were seen. The confounders were checked for controlling which included, age, parity and cephalopelvic measurements. All these information were collected on a prescribed proforma.

### Statistical Analysis Procedure

The collected information was entered into SPSS version 11 and analyzed accordingly. The study variable were age, gravidity, parity, gestational age, labour spontaneous, induced, meconium liquor, epidural anaesthesia, CTG monitoring and birth weight of baby. These variable were analyzed on simple descriptive statistics using mean and standard deviation for numerical variables like, age, gestational age, birth weight of baby and Apgar Score at 1 minute and 5 minutes, and frequency, percentage for qualitative variables like, gravidity, parity, labour (spontaneous or induced), meconium stained liquor, epidural analgesia and CTG monitoring (normal or abnormal).

The outcome variables were maternal outcome, as mode of delivery (Spontaneous vaginal birth, assisted vaginal birth (vacuum/forceps) caesarean section and fetal outcome as Apgar Score (at 1minute and 5 minutes), admission to nursery, neonatal seizures and time of neonatal discharge (in days). Using paired student 't' test for numerical variable time to neonatal discharge and Apgar Score and for qualitative variables (mode of delivery, neonatal seizures, admission to nursery) Chi Square test was used for comparison between groups. P value < 0.05 was considered as significant.

### RESULTS

Sixty pregnant women were taken from labour ward. They were selected as two groups of 30

women in each group. In group A, 30 women with normal CTG monitoring and in group B 30 women with abnormal CTG monitoring.

The mean age in group A was 26.13+3.90 years and mean age in group B was 26.53+4.17 years. The majority of women were in the age range of 26-30 years, 25 (83.3%) women in group A and 23 (76.6%) women in group B (Table-I).

In group A, 11 (36.7%) women were primigravida and 19 (63.3%) women were >2 gravida while in group B, 13 (43.4%) women were primigravida and 17 (56.6%) women were >2 gravida (Table-II).

In group A, 9 (30%) women were nulipara, 17 (56.7%) were 1-2 para, 3 (10%) were 3-4 para and 1 (3.3%) were 5-6 para. While in group B, 12 (40%) women were nullipara, 16 (53.4%) were 1-2 para and 2 (6.6%) were 3-4 para (Table-III).

The mean gestational age in group A was 38.40+1.50 weeks and in group B was 38.60+1.59 weeks (Table-IV).

In group A, 11 (36.7%) women were in spontaneous labour and 19 (63.3%) women were induced while in group B 13 (43.3%) women were in spontaneous labour and 17 (56.7%) women induced (Table-V).

In group A, there were 30 (100%) women with normal CTG and there were also 30 (100%) women with abnormal CTG in group B (Table-VI).

In group A, there were 21 (70%) women with clear and 9 (30%) women with meconium liquor and in group B there were 17 (56.7%) women with clear and 13 (43.3%) women with meconium liquor (Table-VII).

In group A, there were 3 (10%) women who received epidural analgesia and in group B there were 2 (6.6%) women who received epidural analgesia (Table-VIII). The mean fetal birth weight in group A was 3.1+0.35 Kg and in group B was 3.1+0.38 kg (Table-IX).

In group A, 25 (83.3%) women were delivered by spontaneous vaginal birth, 1 (3.3%) woman by assisted vaginal birth (for all other indications) and 4 (13.4%) women by caesarean section (for all other indications). In group B there were 7 (23.3%) women who were delivered by spontaneous vaginal birth, 3 (10%) women by assisted vaginal birth (for abnormal CTG monitoring) and 20 (66.7%) women by caesarean section (for abnormal CTG fetal distress) (Table-X).

In group A, 4 (13.3%) neonatal whose Apgar score at 1 minute were <5, and 26 (86.7%) neonates whose Apgar score were >5 while in group B, 11 (36.6%) neonates whose Apgar score at 1 minute were <5 and 19 (63.4%) neonates whose Apgar score were >5 (Table-XI).

In group A, 3 (10%) neonates whose Apgar score at 5 minutes were <7, and 27 (90%) neonates whose Apgar score were >7 while in group B, 8 (26.6%) neonates whose Apgar score at 5 minute were <7 and 22 (73.4%) neonates whose Apgar score were >7 (Table-XII).

In group A, 1 (3.3%) neonate has seizure and in group B, 2 (6.7%) neonate had seizure (Table-XIII).

In group A, there were 7 (23.3%) neonates who were admitted in nursery, while in group B, there were 19 (63.3%) neonates who were admitted in nursery (Table-XIV).

In group A, 14 (46.7%) neonates who were discharged within 2 days, 7 (23.3%) neonates who were discharged 3-4 days, 6 (20%) neonates who were discharged 5-6 days, and 3 (10) neonates who expired during admission. In group B, 17 (56.7%) neonates who were discharged within 2 days, 7 (23.3%) neonates who were discharged 3-4 days, 4 (13.4%) neonates who were discharged 5-6 days, and 2 (6.6%) neonates who expired during admission. The mean fetal discharge in group A was 2.58+1.59 days and in group B was 2.36+1.58 days (Table-XV).

Age (years)	Group A (n=30)		Group B (n=30)	
	No	%	No	%
18-20	3	10.0	2	6.6
21-25	7	23.4	9	30.0
26-30	18	60.0	14	46.7
31-35	2	6.6	5	16.7
Mean+SD	26.13+3.90		26.53+4.17	

Table-I. Distribution of patients by age

Gravidity	Group A (n=30)		Group B (n=30)	
	No	%	No	%
Primigravida	11	36.7	13	43.4
> 2 gravida	19	63.3	17	56.6

Table-II. Distribution of patients by gravidity

Parity	Group A (n=30)		Group B (n=30)	
	No	%	No	%
0	9	30.0	12	40.0
1-2	17	56.7	16	53.4
3-4	3	10.0	2	6.6
5-6	1	3.3	-	-

Table-III. Distribution of patients by Parity

Gestational age (weeks)	Group A (n=30)		Group B (n=30)	
	No	%	No	%
36-38	17	56.7	14	46.7
39-41	13	43.3	16	53.3
Mean+SD	38.40+1.50		38.6+1.59	

Table-IV. Distribution of patients by gestational age

Labour record	Group A (n=30)		Group B (n=30)	
	No	%	No	%
Spontaneous	11	36.7	13	43.3
Induced	19	63.3	17	56.7

Table-V. Distribution of patients by labour record

CTG	Group A (n=30)		Group B (n=30)	
	No	%	No	%
Normal	30	100.0	0	0
Abnormal	0	0	30	100.0

Table-VI. Distribution of patients by Cardiotocography (CTG) monitoring

Liquor	Group A (n=30)		Group B (n=30)	
	No	%	No	%
Clear	21	70.0	17	56.7
Liquor meconium	9	30.0	13	43.3

Table-VII. Distribution of patients by Meconium liquor

Epidural analgesia	Group A (n=30)		Group B (n=30)	
	No	%	No	%
Yes	3	10.0	2	6.6
No	27	90.0	28	93.4

**Table-VIII. Distribution of patients by epidural analgesia**

Weight (kg)	Group A (n=30)		Group B (n=30)	
	No	%	No	%
2.5-3.0	17	56.7	19	63.3
3.1-3.5	11	36.7	8	26.7
3.6-4.0	2	6.6	3	10.0
Mean+SD	3.12+0.35		3.10+0.38	

**Table-IX. Distribution of patients by fetal birth weight**

Outcome	Group A (n=30)		Group B (n=30)	
	No	%	No	%
Spontaneous vaginal birth	25	83.3	7	23.3
Assisted vaginal birth for abnormal CTG (fetal distress)	0	0	3	10.0
Assisted vaginal birth (For all other indications)	1	3.3	0	0
Caesarean section for abnormal CTG (fetal distress)	0	0	20	66.7
Caesarean section (for all other indications)	4	13.4	0	0

**Table-X. Distribution of patients by mode of delivery**

Apgar Score	Group A (n=30)		Group B (n=30)	
	No	%	No	%
< 5	5	13.3	11	36.6
> 5	26	86.7	19	63.4
Mean+SD	5.48+0.49		5.13+0.51	

**Table-XI. Distribution of patients by Apgar Score at 1 minute**

Apgar Score	Group A (n=30)		Group B (n=30)	
	No	%	No	%
< 7	3	10.0	8	26.6
> 7	27	90.0	22	73.4
Mean+SD	7.52+0.43		7.21+0.48	

**Table-XII. Distribution of patients by Apgar Score at 5 minutes**

Seizures	Group A (n=30)		Group B (n=30)	
	No	%	No	%
Yes	1	3.3	2	6.7
No	29	96.7	28	93.3

**Table-XIII. Distribution of patients by Neonatal Seizures**

Admission	Group A (n=30)		Group B (n=30)	
	No	%	No	%
Yes	7	23.3	19	63.3
No	23	76.7	11	36.7

**Table-XIV. Distribution of patients by admission in Nursery**

Discharge (Days)	Group A (n=30)		Group B (n=30)	
	No	%	No	%
1-2	14	46.7	17	56.7
3-4	7	23.3	7	23.3
5-6	6	20.0	4	13.4
Expired	3	10.0	2	6.6
Mean+SD	2.85+1.59		2.36+1.58	

**Table-XV. Distribution of patients by time to neonatal discharge**

## DISCUSSION

The initial period of elective fetal heart rate monitoring, as a test for fetal surveillance was marked by rapid introduction of a very useful technique, that was expected to improve fetal outcome significantly. The use of continuous fetal heart rate monitoring was soon found to be associated with significant fall in prenatal mortality.<sup>8</sup> However, it has been seen that electronic fetal monitoring is not a specific technique for identifying compromised fetus as many fetuses with a non reassuring fetal heart rate pattern will be perfectly normal at the time of birth.<sup>8</sup>

In this study out of 60 women majority were in age group of 21-30 years with means age of 26.13+3.90 years in group A and 26.53+4.17 in group B. This trend is also seen in other countries like Britain, Colombia, where average reproductive age of women is 29 years.<sup>17</sup> A local study conducted in Multan showed that average age of women at the time of delivery is 20-30 years.<sup>18</sup>

Regarding gravidity, in this study 36.7% women in group A and 43.4% women in group B were primigravida and about 63.3% women in group A and 56.6% women in group B were >2 gravida. This fact is also manifested by local study conducted in Nishter Hospital Multan which showed that 49% women were primipara.<sup>18</sup> A case control study at Mari Land Hospital, United States

of America showed that null parity is the most significant risk factor for caesarean delivery.<sup>19</sup>

In this study, in inclusion criteria >36 weeks of gestation were taken in contrast to >35 weeks in the study conducted at Lady Dufferin Hospital, Karachi conducted by Sheikh et al.<sup>8</sup> So the mean gestational age was found to be 38.40+1.50 weeks in group A and 38.60+1.59 weeks in group B, respectively.

Regarding mode of delivery as maternal outcome women having normal CTG, caesarean section rate was only 13.4% and vaginal delivery rate was being in 83.3% in group A and in group B it was 23.3% that had delivered by vaginal route, 10% by assisted vaginal birth and 66.7% underwent caesarean section. This is supported by study at Services Hospital Lahore, which showed 72% caesarean section were done for abnormal CTG and vaginal delivery was being achieved in 20%.<sup>20</sup> that is comparable with our study. My results were slightly different from Sheikh et al<sup>8</sup> study of Lady Dufferin Hospital Karachi where for pathological CTG, caesarean section rate was 88%. This can be due to my inclusion of both suspicious and pathological CTGs in one group as abnormal CTGs.

The high caesarean rate for fetal distress could not be brought down, if electronic fetal monitoring without adjunctive test is used<sup>21</sup>, thus necessitating the need for additional tests to reduce the number of false positive cases. Fetal scalp blood sampling is one of the sensitive test for identification of acidemic babies and helps the obstetrician in taking an absolute decision it is costly so as an alternative, a simple practical and relatively reliable assessment of fetal state of acidemia can be done by the scalp stimulation test.<sup>16</sup> Studies have shown that no fetus responding to stimulation of scalp had pH 7.21.<sup>16,21,22</sup>

In my study, meconium stained liquor was found to be 30% in normal CTG group and 43.3% in abnormal CTG group. This is contrary to an international study, which showed that 9% of elective caesarean section had meconium while

it was 25% in patients who had an emergency caesarean section for abnormal CTG patients.<sup>23</sup> Meconium staining of liquor has for long been considered as a traditional indicator of fetal distress<sup>24</sup> but it is not proved by studies<sup>25</sup> that the appearance of meconium does not in itself indicate fetal distress as it is often associated with a healthy fetus. So, provided the fetal heart remains normal, fetal acidosis is unlikely.

Regarding fetal outcome as Apgar score babies born with normal CTG 86.7% had good Apgar Score at 1 minute and 90% at 5 minutes while with abnormal CTG 63.4% had good Apgar at 1 minute which were improved and at 5 minutes, 73.4% had good Apgar score and only 26.6% had low Apgars. These results are similar to the Sheikh et al<sup>8</sup> study which shows 18% neonates were having low Apgar at 5 minutes and 81.3% were with good Apgar score (i.e. >7) with pathological CTG. This is similar to results of another local study which showed 72% neonates were born with good Apgar scores despite abnormal intrapartum CTG.<sup>20</sup> This is also supported by another study done at Masaryk University Brno in which 68% babies were born with good Apgar score despite abnormal CTG patterns, only 36% had a poor Apgar score which was indicated by abnormal CTG.<sup>26</sup>

Two babies had neonatal seizures with abnormal CTG. 63.3% of the babies with abnormal CTG were admitted in neonatology ward, 56.7% were discharged with 1-2 days, 23.3% within 3-4 days, 13.4% were discharged with in 5-6 days and 6.6% babies were expired due to complication of meconium aspiration syndrome and birth asphyxia. Unlike Sheikh et al<sup>8</sup> study in which 48% were discharged within 2-4 days with pathological CTG, but has some similar results as 28.3% were discharged with in 24 hours.

Confidential enquiry into still birth and death in infancy published in UK showed an association between adverse fetal outcome and poor education of health personals.<sup>27</sup>

On these grounds, it has been recommended that critical reappraisal of training, assessment, supervision and practice of obstetrician and

midwives should done, and there should be a regular training programme in the use of interpretation of CTG for professionals involved in intrapartum care.

To summarize electronic fetal monitoring in an objective, assessment of fetal well being and supplementation with additional tests may help gain maximum benefit and avoid unnecessary intervention. Newer techniques, for assessing fetal well being are currently in use in UK and USA, yet others are perhaps 5-10 years away. They include fetal scalp blood sampling, continuous blood gas pH measurement, computerized fetal heart analysis, intrauterine probe and fetal ECG waveform analysis.

But for our setups, it seems that there is more to be gained at the moment by improved use of currently available technology than by implementing completely new methods of monitoring.

## CONCLUSIONS

On the basis of our results, it is concluded from this study that intrapartum fetal cardiotocography is not a single indicator of fetal distress. An increased caesarean section rate in babies with a pathological cardiotocography stress on the need for additional tests to differentiate hypoxic from nonhypoxic fetuses.

Copyright© 15 Aug, 2018.

## REFERENCES

1. Wikipedia. The free encyclopaedia. **Cardiotocograph (redirected from EFM) 2011: Oct.** available from: [http://en.wikipedia.org/wiki/electronic\\_fetal\\_monitoring](http://en.wikipedia.org/wiki/electronic_fetal_monitoring).
2. **Royal college of Obstetrics and Gynaecologist. The use of electronic fetal monitoring.** Introduction. London; RCOG 2010.
3. **Electronic fetal monitoring is not necessary for low risk labours (editorials).** Br Med J 2001; 322:1436-7.
4. Taylor MJO, Thomas MJ, Smith MJ, Oseku-Afful S, Fisk NM, Green AR, et al. **Non-invasive intrapartum fetal ECG: preliminary report.** Br J Obst Gynaecol 2013; 112:1016-21.
5. Williams KP, Galerneau F, **Intrapartum fetal heart rate patterns in the prediction of neonatal academia.** Am J Obstet Gynaecol 2003; 188:820-3.
6. Amer-Wahlin I, Hellsten C, Noren H, Hagberg H, Herbst A, Kjellmer I, et al. **Cardiotocography only versus cardiotocography plus ST analysis of fetal electrocardiogram for intrapartum fetal monitoring: A Swedish randomized controlled trial.** Lancet 2001; 358:534-8.
7. East CE, Brennecke SP, King JF, Chan FY, Colditz BP. **On behalf of the FOREMOST study group. The effect of intrapartum fetal pulse oximetry in the presence of a non-reassuring fetal heart rate pattern, on operative delivery rates: a multicenter, randomized controlled trial (the FOREMOST trial).** Am J Obstet Gynaecol 2006; 194: 606-16.
8. Sheikh SM, Kamruddin A, Setna F, Riaz T. **Role of pathological cardiotocography in evaluating fetal well being.** J Coll Physicians Surg Pak 2006; 1616: 404-7.
9. Wasim T. **Cardiotocography in high-risk pregnancy.** Pak Postgrad Med J 2001; 12: 61-5.
10. Freeman R. **Problems with intrapartum fetal heart rate monitoring interpretation and patient management.** Obstet Gynaeco 2002; 100:813.
11. Herbst A. **Prevention of perinatal asphyxia. Can more be done by fetal monitoring.** Lakartidningen 2000; 97:3484-8.
12. Tharmaratnam S. **Fetal distress Belfast City Hospital, UK.** Baillieres Best Pract Res Clin Obstet Gynaecol 2000; 14:155-72.
13. Chuadri R, Syed S. **Ventouse delivery: Maternal and fetal outcome.** J Rawal Med Coll 2002; 6:60-4.
14. Whittle JM, Martin LW. **Fetal monitoring in labour. In: Turnbull's Obstetrics.** 3<sup>rd</sup> ed. London: Churchill Livingstone; 2001: 439-50.
15. Carinhas MJ. **Assessment of fetal well being during labour.** Acta Med Port 2001; 14:399-407.
16. Clark SL, Gimovsky ML, Miller FC. **The scalp stimulation test: A clinical alternative to fetal blood sampling.** Am J Obstet Gynecol 1984; 148:274.
17. Ministry of Health Planning. **Selected vital statistics and health status indicators. One hundred and twenty ninth annual report.** Govt. of British Columbia division of vital statistics 2000; 1.
18. Ali M, Ahmed M, Hafeez R. **Maternal and fetal outcome, comparison between emergency caesarean section versus elective caesarean section.** The Professional 2005; 12: 1.



19. Mohoney SF, Malcoe LH. **Caesarean deliveries in native American women are low rate explained by practice common to the Indian health services.** Birth 2005; 32:170-8.

20. Rasool N, Kauser S, Sohail R, Zaman F. **Cardiography as a predictor of fetal distress.** Pak Postgrad Med J 2007; 18:43-6.

21. Arulkumaran S, Ingemarsson I, Ratnam SS. **Fetal heart rate response to scalp stimulation as a test for fetal well being in labour.** Asia Oceania J Obstet Gynaeco 1987; 13:131-5.

22. Clark SL, Gimovsky ML, Miller FC. **Fetal heart rate response to scalp blood sampling.** Am J Obstet Gynaeco 1982; 144: 706-8.

23. Alchalabi H, Abu-Hejja AT, El-Sunna E, Zayyed F, Badria LF, Obeidat A. **Meconium stained amniotic fluid in term pregnancies: A clinical view.** J Obstet Gynecol 1999; 19: 262-4.

24. Steer P. **ABC of labour care.** London MJ Book 1999; 8-11.

25. Dijkhoom MJ, Visser GH, Touwen BC, Huisjes HJ. **Apgar score meconium and academia at birth in relation to neonatal neurological morbidity in term infants.** Br J Obstet Gynecol 1986; 93:217-22.

26. Pellantova S. **Validity of CTG monitoring for the diagnosis of acute foetal hypxia.** Script medica 2000; 73: 251-60.



27. **Maternal and child health Research Consortium. Confidential enquiry into stillbirths and deaths in infancy: 4<sup>th</sup> annual report London:** Department of Health 1997.

“

*Keep your friends close and your enemies closer.*

– Unknown – ”

**AUTHORSHIP AND CONTRIBUTION DECLARATION**

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Muhammad Ikram	1st Author	
2	Amna Javed	2nd Author	
3	Shafqat Mukhtar	3rd Author	