

Original Article

ADMISSION CARDIOTOCOGRAPHY VERSUS INTERMITTENT AUSCULTATION OF FOETAL HEART RATE AS A PREDICTOR OF FOETAL OUTCOME IN HIGH-RISK CASES: A RANDOMISED CONTROLLED TRIAL

Pranoy Nath^{1✉}, Veena N Hosamani²

ABSTRACT

Background: Admission cardiotocography (CTG) and intermittent auscultation (IA) of the foetal heart rate might help to identify those foetuses that could not withstand the stress of labour and also predict neonatal outcome. Admission CTG is a test done to trace foetal heart rate immediately after admission in labour ward which is usually carried out for 20-30min. FHR monitoring plays the most important role in management of **labouring patient [patient in labour may be a better term]** when incidence of foetal hypoxia and progressive asphyxia increases. Now a day's cardiotocography (CTG) become a popular method for monitoring of foetal wellbeing and it is assisting the obstetrician in making the decision on the mode of delivery to improve perinatal outcome.

Aims and objectives: The aim was to compare the associations of admission CTG and **Intermittent [intermittent]** auscultation of the foetal heart rate with labour and perinatal outcomes in high-risk obstetric population.

Materials and Methods: A hospital-based interventional study [**interventional is not a study design**] was conducted in Silchar Medical College and Hospital, Silchar (Assam), for 1 year from 1st June 2021 to 31st May 2022 after approval from ethical committee. A total of 200 patients attending Obstetrics and Gynaecology Department were examined during the study period.

Results: The present study included 200 patients belonging to high-risk group. Out of the 100 ACTG subjects, 76 (76%) had reactive ACTG, 14 (14%) cases had suspicious ACTG, 10 (10%) cases had pathological ACTG. Out of 100 IA subjects, 89/ (89%) belongs to category 1, remaining 11(11%) belongs to category 2. All 10 patients with pathological ACTG had foetal distress i.e., 100%. It is evident that foetal distress significantly increased with worsening of ACTG ($p < 0.001$). 22(28.9%), 4(28.6%) and 9(90%) neonates in reactive, suspicious and pathological ACTG group had Apgar score at 1 min < 7 respectively. 11(12.4%), 9(81.8%) neonates in Category I and Category II in IA group had Apgar score at 1 min < 7 respectively. Compared with Intermittent auscultation, admission CTG was statistically more significant in predicting the labour, neonatal outcomes, caesarean section rates, 1 min Apgar score less than 7, 5 min Apgar score less

than 7 and admission to SNCU.

Conclusion: Admission CTG was a better predictor of labour and neonatal outcome than admission IA. CTG was therefore highly recommended as an integral tool in the management of labour.

Keywords: Admission cardiotocography (ACTG), Intermittent auscultation (IA), Foetal heart rate (FHR). Emergency

INTRODUCTION

Admission CTG is a test done to trace foetal heart rate immediately after admission in labour ward which is usually carried out for 20-30min.¹ Among various new techniques of antepartum foetal surveillance, admission CTG is being used extensively in the management of high-risk pregnancy which have contributed in significant reduction in perinatal mortality and morbidity.

Abnormal CTG may represent a foetus suffering from chronic hypoxia and thus having little reserve to withstand the stress of labour, or it may be the result of significant uterine contractions. The findings would allow for timely intervention.^{2,3} Approximately 140 million birth occurs globally every year.⁴ Majority of these births are normal vaginal delivery among pregnant women with no antenatal risk factors complicating either themselves or their babies at the time of labour.^{5,6} Approximately half the stillbirths and ¼ of the neonatal deaths results from complications at the time of labour and delivery.⁷ Therefore, it is better to monitor the foetus adequately during labour and also on admission to the labour ward. The WHO however doesn't recommend routine CTG in healthy pregnant women, presenting with spontaneous labour on labour room admission for foetal wellbeing, but auscultation using doppler ultrasound device, pinard stethoscope is recommended after admission in labour room for assessing foetal wellbeing.⁸ The admission cardiotocogram is a brief (20-minute) recording of the FHR immediately following admission to the labour ward.⁹ The key reason for an admission cardiotocogram is that labour uterine contractions stress the placental circulation; an abnormal tracing implies a deficiency and thus helps to identify foetal compromise at an earlier than usual enough stage to allow intervention.¹⁰ The test was introduced as a risk screening in early labour in order to detect the compromised foetus on admission and to identify the women who would require continuous electronic foetal monitoring during labour.^{9,11}

British guidelines from 2001¹² do not recommend admission CTG for low-risk women, whereas Swedish guidelines from the same year¹³ propose the test for all women.

MATERIAL AND METHOD

A hospital-based **intervention** study was conducted in Silchar Medical College and Hospital, Silchar (Assam), for 1 year from 1st June 2021 to 31st May 2022 after approval from ethical committee. A total of 200 patients attending Obstetrics and Gynaecology Department were examined during the study period.

INCLUSION CRITERIA

Women who had gestational age > 36 weeks in first stage of labour with high risk factors like anaemia, PIH, diabetes mellitus [**GDM or PGDM or BOTH**], Rh negative, PROM, IUGR (Intrauterine growth restriction), post-dated pregnancy, bad obstetrics history, oligohydramnios and decrease foetal movements.

EXCLUSION CRITERIA

1. Patients who are not willing to participate in the study [this is an implied exclusion criteria for all

studies, non-specific].

2. Patient excluded in this study group were gestational age < 36 weeks and all antenatal patient without mentioned obstetric high-risk factors in inclusion criteria. [implied]

Details of the study protocol was explained to the study participants. Informed consent was obtained. Demographic data of the participants were recorded in the designed questionnaire. Detailed history was taken. General Physical, Systemic and obstetrics Examination was done. Routine blood investigations were done. Ultrasonography of gravid uterus was also done.

Randomization- The women were randomly allocated into 2 groups of 100 each. Group A includes those monitored with admission CTG and Group B includes those monitored with Intermittent Auscultation (IA). The randomization sequence was computer generated, using block randomization, with random block sizes of two or four, and stratification by study site. Due to the nature of the intervention, blinding was not possible at participant and clinician level; however, the biostatistician performing the analysis was blinded to group allocation during the analysis process.

Patients were first given a description of the procedure they **would** have to undergo after a preliminary history taking, thorough general examination & obstetric examination. Informed consent was taken. Later 100 patients in group A were subjected to admission test using Sonicaid fetal monitor at speed of 3cm/min for 20 minutes after initial assessment to document vital signs, obstetric examination to confirm the foetal lie, presentation, station, cervical dilatation and status of membranes. After ensuring maternal hydration and food intake.

Admission test is recording of foetal heart rate and uterine contraction in labour for a period of 20 minutes. The trace thus obtained was classified as Normal, Suspicious, and Pathological according to National Institute for Health and Care Excellence (NICE) guidelines (2007)¹⁴ and managed according to NICE guideline¹⁵

NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE (NICE) GUIDELINES

TABLE 1: Categorization of fetal heart rate features¹⁴

Feature	Baseline (bpm)	Variability (bpm)	Decelerations	Accelerations
Reassuring	110-160	≥ 5	None	Present
Non-reassuring	100-109 161-180	< 5 for 40-90 minutes	Typical variable decelerations with over 50% of contractions, occurring for over 90 minutes Single prolonged deceleration for up to 3 minutes	The absence of accelerations with otherwise normal trace is of uncertain significance
Abnormal	<100 >180	< 5 for 90 minutes	Either atypical variable	

	Sinusoidal pattern ≥ 10 minutes		decelerations with over 50% of contractions or late decelerations, both for over 30 minutes Single prolonged deceleration for more than 3 minutes	
--	--	--	--	--

Table 2: CARDIOTOCOGRAPH CLASSIFICATION¹⁴

Category	Definition
Normal	A CTG where all four features fall into the 'reassuring' category
Suspicious	A CTG where one of the features fall into 'non-reassuring category' and the remainder of the features are reassuring
Pathological	A CTG whose features fall into two or more non-reassuring categories or one or more abnormal categories

Later 100 people in group B were monitored with only intermittent auscultation (IA) either with stethoscope or with hand held doppler, after performing Leopold's manoeuvres to identify the foetal presentation and position, assist the labouring woman into a position that maximizes audibility and preserves comfort and also after assessing the uterine contractions by palpation. Subsequently count the foetal heart rate after a uterine contraction for 30 to 60 seconds every 15 to 30 minutes in active labour and every 5 minutes in the second stage of labor. Findings are interpreted into two categories. **These two** categories are consistent with the NICHD/American Congress of Obstetricians and Gynecologists (ACOG) three-tier system of three categories and have been adapted to reflect the FHR characteristics obtainable via IA.¹⁶

Category I FHR characteristics by auscultation include all of the following:

Normal FHR baseline between 110 and 160 bpm

Regular rhythm

Presence of FHR increases or accelerations from the baseline.

Absence of FHR decreases or decelerations from the baseline

Category II FHR characteristics 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 10 minutes in duration)

STATISTICAL ANALYSIS

Categorical variables are expressed as number of patients and percentage of patients and compared across the groups using Pearson's Chi square test for independence of attributes/Fisher's exact test as appropriate. Relative risk was used for risk association in few circumstances. The statistical software SPSS version 22 has been used for the analysis. An alpha level 5% has been taken, i.e., if any p value is less than 0.05 it has been considered as significant.

RESULTS

A total number of 200 (two hundred) patients with high-risk pregnancy who were admitted in the Department of Obstetrics and Gynecology, Silchar Medical College were allocated randomly into 2 groups of 100 each i.e., admission CTG and IA group during the period of 1 year (JUNE 2021 to MAY 2022) as per the inclusion and exclusion criteria.

Out of 100 subjects who were randomly received admission CTG only for foetal monitoring as an intervention method, 76(76%) subjects had reactive ACTG, 14(14%) subjects had suspicious ACTG, 10(10%) subjects had pathological CTG.

Admission CTG	ACTG group
	Number of subjects
Reactive	76(76%)
Suspicious	14(14%)
Pathological	10(10%)
Total	100(100%)

TABLE 3. PATTERN OF ADMISSION CTG ONLY

Among 100 subjects who randomly received IA only as an intervention method for foetal monitoring, 89(89%) subjects fall under category 1 and 11(11%) subjects fall under category 2

Intermittent auscultation	Number of subjects in IA group
	Category I
Category II	11(11%)
Total	100(100%)

TABLE 4. PATTERNS OF INTERMITTENT AUSCULTATION ONLY

Among 100 ACTG subjects total 76(76%) subjects were showing reactive trace in which 32(42.1%) subjects were post-dated pregnancy, 22(28.9%) were having PIH, 9(11.8%) subjects had pre mature

rupture of membrane (PROM). 4(5.3%) of subjects had oligohydramnios. 4(5.3%) of subjects had bad obstetrics history (BOH). 1(1.3%) subject was anaemic. 2(2.6%) subjects had GDM. 2(2.6%) subjects had Rh negative pregnancy. Remaining 14(14%) subjects showed suspicious pattern of ACTG in which 3(21.4%) subjects were post-dated pregnancy, 8(57.1%) were having PIH, 1(7.1%) subject had premature rupture of membrane (PROM) .1(7.1%) subject had oligohydramnios. 1(7.1%) subject had bad obstetrics history (BOH). Rest subjects showed pathological trace of ACTG which includes 10(10%) subjects in which 5(50%) subjects were post-dated pregnancy, 2(20%) were having PIH, 1(10%) subject had premature rupture of membrane (PROM). 1(10%) subject had oligohydramnios. 1(10%) subject had bad obstetrics history (BOH).

Risk factor	Admission CTG				p value
	Reactive	Suspicious	Pathological	Total	
AN	1(1.3%)	0(0%)	0(0%)	1(1%)	0.912
BOH	4(5.3%)	1(7.1%)	1(10%)	6(6%)	
GDM	2(2.6%)	0(0%)	0(0%)	2(2%)	
O	4(5.3%)	1(7.1%)	1(10%)	6(6%)	
PD	32(42.1%)	3(21.4%)	5(50%)	40(40%)	
PIH	22(28.9%)	8(57.1%)	2(20%)	32(32%)	
PROM	9(11.8%)	1(7.1%)	1(10%)	11(11%)	
RH	2(2.6%)	0(0%)	0(0%)	2(2%)	
Total	76(100%)	14(100%)	10(100%)	100(100%)	

TABLE 5. REACTIVITY OF CTG ACCORDING TO HIGH RISK FACTOR
[short forms of risk factors preferably be avoided]

Among 100 subjects of IA group 89(89%) subjects fall under category 1, in which 37(41.6%) subjects were having post-dated pregnancy followed by 28(31.5%) subjects were diagnosed PIH cases. 10(11.2%) subjects had pre mature rupture of membrane (PROM) .5(5.6%) subjects had oligohydramnios. 5(5.6%) subjects had bad obstetrics history (BOH). 1(1.1%) subject in were anaemic. 2(2.2%) subjects had GDM. 1(1.1%) subject had Rh negative pregnancy. Remaining 11(11%) subjects fall under category 2, in which 3(27.3%) subjects were having post-dated pregnancy followed by 4(36.4%) subjects were diagnosed PIH cases. 1(9.1%) subject had pre mature rupture of membrane (PROM).1(9.1%) subject had oligohydramnios. 1(9.1%) subject had bad obstetrics history (BOH). 1(9.1%) subject had Rh negative pregnancy.

Risk factor	Intermittent auscultation			p value
	CI	CII	Total	
AN	1(1.1%)	0(0%)	1(1%)	0.722
BOH	5(5.6%)	1(9.1%)	6(6%)	
GDM	2(2.2%)	0(0%)	2(2%)	
O	5(5.6%)	1(9.1%)	6(6%)	
PD	37(41.6)	3(27.3%)	40(40%)	
PIH	28(31.5)	4(36.4%)	32(32%)	
PROM	10(11.2)	1(9.1%)	11(11%)	
RH	1(1.1%)	1(9.1%)	2(2%)	
Total	89(100%)	11(100%)	100(100%)	

TABLE 6. CATEGORIZATION OF IA GROUP ACCORDING TO HIGH RISK FACTOR.

In ACTG reactive cases, 11(14.5%) cases had foetal distress and 65(85.5%) cases had no foetal distress. In ACTG suspicious cases, 5(35.7%) cases had foetal distress and 9(64.3%) cases had no foetal distress. In pathological traces of ACTG, 10(100%) cases had foetal distress. [the diagnostic parameter of foetal distress should be specified]

Fetal distress	Admission CTG				P value
	Reactive	Suspicious	Pathological	Total	
No	65(85.5%)	9(64.3%)	0(0%)	74(74%)	<0.001
Yes	11(14.5%)	5(35.7%)	10(100%)	26(26%)	
Total	76(100%)	14(100%)	10(100%)	100(100%)	

TABLE 7. CORRELATION OF ACTG FINDINGS WITH FOETAL DISTRESS.

In ACTG reactive cases, 3(3.9%) cases had meconium-stained liquor and 73(96.1%) cases had no signs of meconium stain. In ACTG suspicious cases, 2(14.3%) cases had meconium-stained liquor and 12(85.7%) cases had no meconium stain. In pathological traces of ACTG, 7(70%) cases had meconium-stained liquor while the rest didn't have.

Meconium staining	Admission CTG				P value
	Reactive	Suspicious	Pathological	Total	
NO	73(96.1%)	12(85.7%)	3(30%)	88(88%)	<0.001
YES	3(3.9%)	2(14.3%)	7(70%)	12(12%)	
Total	76(100%)	14(100%)	10(100%)	100(100%)	

TABLE 8: CORRELATION OF ACTG FINDINGS WITH MECONIUM-STAINED LIQUOR.

Out of 11(11%) cases of category II, 11(100%) had foetal distress. Remaining cases didn't show any signs of foetal distress in both the groups.

Fetal distress	Intermittent auscultation			p value
	Category I	Category II	Total	
No	89(100%)	0(0%)	89(89%)	<0.001
Yes	0(0%)	11(100%)	11(11%)	
Total	89(100%)	11(100%)	100(100%)	

TABLE 9: CORRELATION OF IA FINDINGS WITH FOETAL DISTRESS.

Out of 11(11%) cases of category II, 6(54.5%) cases had meconium-stained liquor and remaining cases didn't show any meconium-stained liquor in both the groups

Meconium staining	Intermittent auscultation			p value
	Category I	Category II	Total	
NO	89(100%)	5(45.5%)	94(94%)	<0.001
YES	0(0%)	6(54.5%)	6(6%)	
Total	89(100%)	11(100%)	100(100%)	

TABLE 10: CORRELATION OF IA FINDINGS WITH MECONIUM-STAINED LIQUOR.

Incidence of spontaneous vaginal delivery in reactive ACTG group with fetal distress was 4 (9.8%) and without fetal distress was 37(90.2%). Whereas in suspicious ACTG group 4(57.1%) cases had SVD without fetal distress, and 3(42.9%) cases had SVD with FD. In pathological ACTG group 1(100%) cases had SVD with fetal distress. Incidence of LSCS delivery in reactive ACTG group with fetal distress was 4 (14.8%) and without fetal distress was 23(85.2%). Whereas in suspicious ACTG group 5(83.3%) cases had LSCS without fetal distress, and 1(16.7%) case had LSCS with FD. In pathological ACTG group 8(100%) cases had LSCS with fetal distress. Incidence of instrumental delivery in reactive ACTG group with fetal distress was 3 (37.5%) and without fetal distress was 5(62.5%). Where as in suspicious ACTG group 1(100%) case had instrumental delivery with fetal distress. And in pathological ACTG group 1(100%) case had instrumental delivery with fetal distress. [rewrite the paragraph with proper sentence construction]

Out of 89(89%) cases of Category I, 63(70.8%) cases had spontaneous vaginal delivery without fetal distress, 17(19.1%) cases underwent LSCS without foetal distress, 9(10.1%) cases underwent instrumental delivery without foetal distress. Out of 11(11%) cases of Category II, 1(9.1%) case had spontaneous vaginal delivery with foetal distress, 9 (81.8%) cases underwent LSCS with foetal distress, 1(9.1%) case underwent instrumental delivery with foetal distress.

In our study, 55(27.5%) babies born had a APGAR score at 1 min of <7 and 145(72.5%) had score >7. Out of babies with score <7, 35(35%) of their mothers were monitored by ACTG and 20(20%) were monitored by IA. Out of babies with score >7, 65(65%) of their mothers were monitored by ACTG and 80(80%) were monitored by IA. These results were significant with p value 0.018.

APGAR score at 1 min	Group			p value	Relative Risk	95% CI
	ACTG	IA	Total			
<7	35 (35%)	20 (20%)	55 (27.5%)	0.018	Ref (<7)	
>7	65 (65%)	80 (80%)	145 (72.5%)		1.42	1.084- 1.858
Total	100 (100%)	100 (100%)	200 (100%)			

TABLE 11: CORRELATION OF APGAR SCORE AT 1 MIN IN BOTH ACTG AND IA GROUPS

In our study, 22(11%) babies born had APGAR score at 5 min as <7 and 178(89%) had score >7. Out of babies with score <7, 13(13%) of their mothers were monitored by ACTG and 9(9%) were monitored by IA. Out of babies with score >7, 87(87%) of their mothers were monitored by ACTG and 91(91%) were monitored by IA.

APGAR score at 5 min	Group			p value	Relative Risk	95% CI
	ACTG	IA	Total			
<7	13 (13%)	9 (9%)	22 (11%)	0.366	Ref (<7)	
>7	87 (87%)	91 (91%)	178 (89%)		1.209	0.828- 1.766
Total	100 (100%)	100 (100%)	200 (100%)			

Table 12: Correlation of APGAR score at 1 min in both ACTG and IA groups

In this study out of 76(76%) reactive CTG cases 2(2.6%) babies had died. Out of 14(14%) suspicious ACTG cases, 1(7.1%) baby died. Out of 10(10%) pathological cases, 2(20%) babies had died.

Perinatal outcome	Admission CTG				p value
	Reactive	Suspicious	Pathological	Total	
AL	74 (97.4%)	13 (92.9%)	8 (80%)	95 (95%)	0.025
ND	2 (2.6%)	1 (7.1%)	2 (20%)	5 (5%)	
Total	76 (100%)	14 (100%)	10 (100%)	100 (100%)	

TABLE 13: CORRELATION BETWEEN CTG REACTIVITY AND PERINATAL MORTALITY

In our study, out of 89(89%) category I cases 1(1.1%) baby died. Out of 11(11%) category II cases, 2(18.2%) babies died.

Perinatal outcome	Intermittent auscultation			p value
	CI	CII	Total	
Alive	88(98.9%)	9(81.8%)	97(97%)	0.002
Neonatal death	1(1.1%)	2(18.2%)	3(3%)	
Total	89(100%)	11(100%)	100(100%)	

TABLE 14: CORRELATION BETWEEN IA FINDINGS AND PERINATAL MORTALITY

DISCUSSION

1. PATTERN OF ADMISSION CARDIOTOCOGRAPHY: Out of 100 subjects who were randomly received admission CTG only for foetal monitoring in our study as an intervention method, 76(76%) subjects had reactive ACTG, 14(14%) subjects had suspicious ACTG, 10(10%) subjects had pathological CTG. Similar findings were seen in study by Rahman et al¹⁷, where 76.9% cases had reactive CTG, 14.4% had suspicious CTG and 8.7% had pathological CTG. Abbey Met al¹⁸ found 71.43% reactive ACTG, 3.17% had suspicious ACTG and 25.4% had pathological ACTG.
2. PATTERN OF INTERMITTENT AUSCULTATION: Among 100 subjects who randomly received IA only as a [an] intervention method for fetal monitoring, 89(89%) subjects fall [tense of the verb should be corrected] under category 1 and 11(11%) subjects fall under category 2. The results were similar to study done by Abbey et al¹⁸, where 84.92% were in category I and 15.08% were in category II.
3. FOETAL DISTRESS: According to our study, in ACTG reactive cases, 11(14.5%) cases had foetal distress and 65(85.5%) cases had no foetal distress. In ACTG suspicious cases, 5(35.7%) cases had foetal distress and 9(64.3%) cases had no foetal distress. In pathological traces of ACTG, 10(100%) cases had foetal distress. It is evident that foetal distress significantly increased with worsening of admission CTG (p<0.001)
 Similar findings were found by Rahman et al¹⁷, 11.3% had foetal distress in reactive group, 39.1% had foetal distress in suspicious group and 85.7% had foetal distress in pathological group. Abbey M et al¹⁸ had found similar results of 10% foetal distress in reactive CTG, 25% foetal distress in suspicious CTG and 39.1% had foetal distress in pathological CTG. Aparna Hedge et al¹⁹ had found 3.6% foetal distress in reactive group, 15% in suspicious group and 75% in pathological group. In our study, out of 11(11%) cases of category II of IA group, 11(100%) had foetal distress (P<0.001). There is no distress in category I. It is evident from our results that Admission CTG is better than IA in predicting foetal distress.
4. MECONIUM STAINING: According to our study, in ACTG reactive cases, 3(3.9%) cases had meconium-stained liquor and 73(96.1%) cases had no signs of meconium stain. In ACTG suspicious cases, 2(14.3%) cases had meconium-stained liquor and 12(85.7%) cases had no meconium stain. In pathological traces of ACTG, 7(70%) cases had meconium-stained liquor rest didn't have. It is evident that meconium staining associated foetal distress significantly increased with worsening of admission CTG (p<0.001) Out of 11(11%) cases of category II in IA group, 6(54.5%) cases had meconium-stained liquor (p<0.001) Similar results were seen in study done by Rahman et al¹⁷, where 8.9% had meconium stain in reactive group, 39.1% in suspicious group

and 71.4% in pathological group. It is evident from our results that Admission CTG is better than IA in predicting meconium staining associated foetal distress.

5. MODE OF DELIVERY:

In our study, incidence of spontaneous vaginal delivery in reactive ACTG group with foetal distress was 4 (9.8%) and without foetal distress was 37(90.2%). Where as in suspicious ACTG group 4(57.1%) cases had SVD without foetal distress, and 3(42.9%) cases had SVD with FD. In pathological ACTG group 1(100%) cases had SVD with foetal distress. Incidence of LSCS delivery in reactive ACTG group with foetal distress was 4 (14.8%) and without foetal distress was 23(85.2%). Whereas in suspicious ACTG group 5(83.3%) cases had LSCS without foetal distress, and 1(16.7%) case had LSCS with FD. In pathological ACTG group 8(100%) cases had LSCS with foetal distress. Incidence of instrumental delivery in reactive ACTG group with foetal distress was 3 (37.5%) and without foetal distress was 5(62.5%). Where as in suspicious ACTG group 1(100%) case had instrumental delivery with foetal distress. And in pathological ACTG group 1(100%) case had instrumental delivery with foetal distress. The results were statistically significant with higher rate of LSCS in pathological group ($p < 0.001$). Similar statistically significant results were found in study done by Rahman et al¹⁷, where 49.37% had spontaneous vaginal delivery, 10% had instrumental delivery and 40.62% had LSCS. In IA group, out of 89(89%) cases of Category I, 63(70.8%) cases had spontaneous vaginal delivery without foetal distress, 17(19.1%) cases underwent LSCS without foetal distress, 9(10.1%) cases underwent instrumental delivery without foetal distress. Out of 11(11%) cases of Category II, 1(9.1%) case had spontaneous vaginal delivery with foetal distress, 9 (81.8%) cases underwent LSCS with foetal distress, 1(9.1%) case underwent instrumental delivery with foetal distress. It is evident from our results that statistically significant ($p < 0.001$) higher rates of LSCS (41%) were seen in Admission CTG group when compared to IA group (26%). Similar statistically significant results were seen in Abbey M et al¹⁸ with 70.59% LSCS in Admission CTG group and 41.18% LSCS in IA group.

6. APGAR SCORE AT 1 MIN: In our study, 55(27.5%) babies born had a APGAR score at 1 min of <7 and 145(72.5%) had score >7 . Out of babies with score <7 , 35(35%) of their mothers were monitored by ACTG and 20(20%) were monitored by IA. Out of babies with score >7 , 65(65%) of their mothers were monitored by ACTG and 80(80%) were monitored by IA. These results were significant with p value 0.018. ACTG group has slightly higher detection rate of APGAR score of <7 at 1 minute compared to IA group. Similar results were seen in study by Abbey M *et al*¹⁸, where 89.66% had <7 score at 1minute in ACTG group and 41.18% had <7 score at 1 minute in IA group.
7. APGAR SCORE AT 5 MIN: In our study, 22(11%) babies born had APGAR score at 5 min as 7. Out of babies with score 7, 87(87%) of their mothers were monitored by ACTG and 91(91%) were monitored by IA. There is no significant difference in two groups (p value 0.366).
8. ADMISSION TO SNCU: In our study, 35% of babies born were admitted to SNCU in ACTG monitoring group whereas 19% were admitted in IA group. Abbey M et al¹⁸ found similar results with 51% and 30% admission rates in ACTG group and IA group. ACTG group has more admission rate compared to IA group.
9. PERINATAL MORTALITY: In our study, 5(5%) neonatal deaths were seen in ACTG group and 3(3%) neonatal deaths were seen in IA group. There is no statistical difference in two groups. Similarly Abbey M et al¹⁸ found no statistical difference in determining perinatal mortality in two groups.

CONCLUSION

Compared with Intermittent auscultation, admission CTG was statistically more significant in predicting the labour, neonatal outcomes, caesarean section rates, 1 min Apgar score less than 7, 5 min Apgar score less than 7 and admission to SNCU. The differences were not statistically significant in the following circumstances, that is 5 min Apgar score >7.

REFERENCES

1. Ingemarsson I. Electronic foetal monitoring as a screening test. In: Spencer JAD, Ward RHT, eds. Intrapartum foetal surveillance. London: Royal College of Obstetricians and Gynaecologists; 1993: 45-52
2. Impey L, Reynolds M, MacQuillan K, Gates S, Murphy J, Sheil O Admission cardiotocography: a randomised controlled trial. *Lancet*. 2003;361(9356):465-70.
3. Penning S, Thomas JG. Management of fetal distress. *Obstet J Obstet gynecol Clin North Am*. 1999;26(2):259-74
4. UNICEF. Fact sheet: The state of the world's children 2016: a fair chance for every child. New York (NY), 2016. Available at:https://www.unicef.org/publications/files/UNICEF_SOWC_2016.pdf. Accessed on 19 June 2021
5. Danilack VA, Nunes AP, Phipps MG. Unexpected complications of low-risk pregnancies in the United States. *American journal of obstetrics and gynecology*. 2015 Jun 1;212(6):809-e1.
6. National Institute for Health and Care Excellence. Fact sheet: Intrapartum care for healthy women and babies. NICE clinical guideline,2014.Availableat:http://www.geburtshaus.ch/documents/upload/NICE_clinical_guideline190dec2014.pdf.
7. Lawn JE, Blencowe H, Waiswa P, Amouzou A, Mathers C, Hogan D, Flenady V, Frøen JF, Qureshi ZU, Calderwood C, Shiekh S. Stillbirths: rates, risk factors, and acceleration towards 2030. *The Lancet*. 2016 Feb 6;387(10018):587-603.
8. WHO recommendation on routine assessment of foetal well-being on labour admission. 15 February 2018.
9. Ingemarsson I, Arulkumaran S, Ingemarsson E, Tambyraja RL, Ratnam SS. Admission test:A screening test for fetal distress in labor. *ObstetGynecol* 1986 Dec;68(6):800-6.
10. Prentice A, Lind T. Fetal heart rate monitoring in labour-too frequent intervention, too little benefit?. *Lancet* 1997 Dec;2:1375-7.
11. Robinson B, Nelson L. A review of the proceedings from the 2008 NICHD workshop on standardized nomenclature for cardiotocography: update on definitions, interpretative systems with management strategies, and research priorities in relation to intrapartum electronic fetal monitoring. *Reviews in Obstetrics and Gynecology*. 2008;1(4):186.
12. Royal College of Obstetricians and Gynaecologists. The use of electronic foetal monitoring. London: RCOG Press, 2001.
13. Nordström L, Waldenström U. Handläggning av normal födsel (Management of normal labour). Stockholm:Socialstyrelsen, 2001.
14. Sri Sabartnam Arulkumaran, Rohan D' Souza, Intrapartum fetal monitoring: the management of labour, 3rd edition, Pg. 85-111.
15. Delgado Nunes V, Gholitabar M, Sims J, Bewley S. Intrapartum care of healthy women and their babies: summary of updated NICE guidance. *BMJ*. 2014;349(dec03 6):g6886- g6886.
16. Lyndon A, Ali LU. Fetal heart monitoring principles and practices, 4th ed. Dubuque, IA: Kendall-Hunt Publishing, 2009.

17. Rahman H, Renjhen P, Dutta S, Kar S. Admission cardiotocography: Its role in predicting foetal outcome in highrisk obstetric patients. Australasian Medical Journal (Online). 2012 Oct 1;5(10):522.
18. Abbey M, Green KI. Admission cardiotocography versus Doppler auscultation of fetal heart in high-risk pregnancy in a tertiary health facility in Nigeria. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2021 Sep 1;10(9):3268-77.
19. Hegde Aparna, Kore Shailesha, Srikrishna Sushma, et al. Admission test:screening test for prediction of fetal outcome in labour. J Obstet & Gynaec of India 2001; 51(2): 40-43.

Received on 24.5.23

Revised on 10.06.23

Accepted on 26.6.23

Published 15.7.23

Citation: Nath P, Hosamani V. Admission cardiotocography versus intermittent auscultation of foetal heart rate as a predictor of foetal outcome in high-risk cases: a randomized controlled trial. J Indian Acad Obstet Gynecol. 2023;5(1): 1-13.

1. Professor and Head, OB-GYN,
Department of Obstetrics and Gynaecology, Silchar
Medical College and Hospital, Assam.
2. Junior Resident, OB-GYN,
Department of Obstetrics and Gynaecology, Silchar
Medical College and Hospital, Assam.

✉ Mail: drnathdas@gmail.com

CC BY license: Allows anyone to copy, distribute and transmit work; adapt work; make commercial use of the work under the condition that the user must attribute the work in the manner specified by the author or licensor (but not in any way that suggests they endorse the user or their use of the work)