

Admission Test: Cardiotocograph as a Marker of Fetal Outcome: A Case Series StudyAnita Goura¹, Anuja Sagamkunti², Asharani Kanaki³, Soumya R Patil⁴^{1,2,3,4}Assistant Professor ,Dept. of Obg, Mahadevappa Rampure Medical College, Klb**Received: 16-08-2023 / Revised: 28-09-2023 / Accepted: 05-10-2023****Corresponding author: Dr Soumya R Patil****Conflict of interest: Nil****Abstract:****Background and Objectives:** To study the cardiotocography at admission. To assess the fetal outcome of in relation to cardiotocograph.**Materials and Method:** Pregnant woman with term gestation, singleton pregnancy, vertex presentation with no associated high risk factors, in active labour were included. Admission cardiotocography was done and checked whether it was assuring or non-assuring, and perinatal outcome was tested with APGAR scoring at 1 and 5 minute. This study was conducted at H.S. Kumareshwara Hospital and research centre over a period of 18 months from January 2014 to May 2015, 185 patients were included.**Results:** The reassuring CTG had no significance for perinatal outcome, whereas the non-reassuring CTG had significance at APGAR score of 5 minutes. The sensitivity at 1 minute APGAR score was 65.89% and specificity was 30.36%, the sensitivity and specificity at 5 minute APGAR was 70.32% and 50% respectively. We found the T value of 1.280, and P value of 0.934 at APGAR score at 1 minute which doesn't seem to be significant. The T value at APGAR score at 5 minute was 2.923 and P value of 0.004 which has high significance.**Conclusion:** CTG can be a reliable testing to prevent birth asphyxia in low resource setting, and to take decision about surgical intervention. Hence with a high significance we can use CTG to predict the fetal outcome.**Keywords:** CTG ,Pregnancy Induced Hypertension, Ultrasonograph.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

The enduring challenge of obstetrics lies in the need to care for two patients simultaneously. One, the mother, who can express her feeling, the other is the fetus who is hidden from our view and unable to express the same. Formerly, methods to evaluate the baby were rather crude and primitive but, recent times have seen rapid development and ever increasing sophistication. More goes into the delivery of a healthy baby, with the maximum potential for a healthy life. Not all the mothers and babies are blessed with a trouble free labour. Care at the time of actual delivery is important to realise the full health potential of a fetus. Surveillance of the fetus during labor is important to ensure the delivery of a healthy baby in good condition with the minimum of intervention [2]. To avoid fetal complications and in order to institute preventive and remedial measures, has led to the development of various bio-chemical and biophysical screening. Obstetric practice has been revolutionised by the fact that in-utero environment may not be favourable for the fetus and the fetus may be compromised in labour. The art and science of obstetrics has advanced to such a level of

sophistication that today's doctor and patient expect not only a favourable outcome but the most favourable outcome. The objectives of fetal heart rate monitoring are to ensure that any harm which might threaten or befall the fetus in-utero can be recognised in time to allow removal of the fetus from the hostile environment. All of us who practice obstetrics are greatly indebted to the early meticulous and untiring efforts of Dr. Edward Hon who systemized the science of foetal heart rate monitoring and uncoded the language of fetus. Following earlier work by Hon (1958), continuous electronic fetal monitoring (EFM) was introduced into obstetrical practice in the late 1960s. No longer were intrapartum fetal surveillance and the suspicion of fetal distress based upon periodic auscultation with a fetoscope. Instead, the continuous graph-paper portrayal of the fetal heart rate was potentially diagnostic in assessing pathophysiological events affecting the fetus. [1] When first introduced, electronic fetal heart rate monitoring was used primarily in complicated pregnancies, but gradually became used in most pregnancies. By 1978, it was estimated that nearly

two thirds of American women were being monitored electronically during labor (Banta and Thacker, 1979). In 2002, approximately 3.4 million American women, comprising 85 percent of all live births, underwent electronic fetal monitoring (Martin and colleagues, 2003). Indeed, fetal monitoring has become the most prevalent obstetrical procedure in the United States (American College of Obstetricians and Gynaecologists, 2005). [1] The expectations of cardiotocography being:

- Electronic fetal heart rate monitoring provided accurate information.
- The information was of value in diagnosing fetal distress.
- It would be possible to intervene to prevent fetal death or morbidity.

Routine and continuous electronic monitoring of foetal heart rate (FHR) in labour has become an established obstetric practice in high-risk pregnancies in industrialised countries. However, the same may not be possible in non- industrialised countries where antenatal care is inadequate with a large number of high-risk pregnancies being delivered in crowded settings and inadequate health care provider to patient ratios [3]. But admission cardiotocography still remains debatable. Cardiotocographic (CTG) monitoring remains the basis of intrapartum surveillance, but its interpretation by healthcare professionals lacks

reproducibility and the technology has not been shown to improve clinically important outcomes.

Methodology

Source of Data: 185 Women of >36 weeks of gestation in labor, admitted under Obstetrics and gynecology Department in Hanagal Shree Kumarashwera Hospital, Bagalkot were included in the study.

Method of Collection of Data `

Study Design: A case series study.

Study Area: H.S. Kumareshwara Hospital and Research Centre, Bagalkot.

Inclusion Criteria: patients with

Full term gestation

Singleton pregnancy

Longitudinal lie with Vertex presentation.

Exclusion Criteria:

Intrauterine death

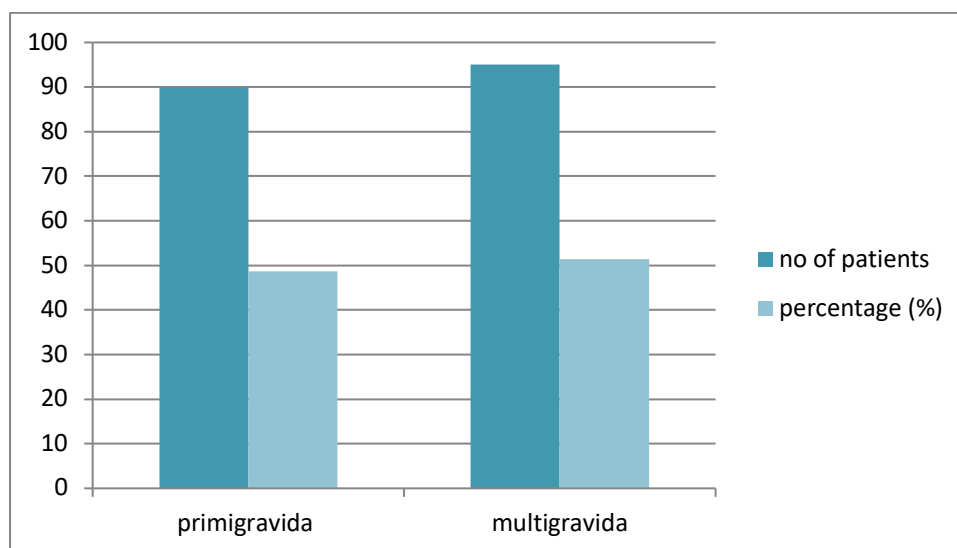
High risk pregnancies

Results and Observation

The total number of patients included was 185, all underwent admission CTG, and all were in active labour.

Table 1: Parity distribution

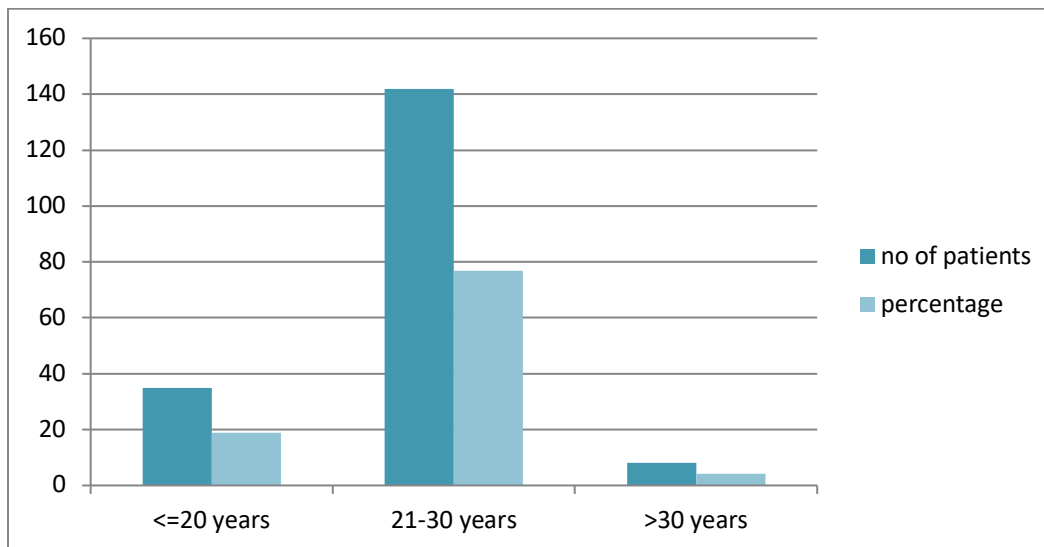
	No. of patients	Percentage (%)
Primigravida	90	48.6
Multigravida	95	51.4
Total	185	100



Graph 1 : Parity distribution.

Table 2: Age wise distribution of cases

	Number of patients	Percentage (%)
<= 20 years	35	18.9
21-30 years	142	76.8
>31 years	8	4.3
total	185	100



Graph 2: Age wise distribution of cases

Table 3: Number of reassuring and non reassuring CTG

	Total number	Percentage (%)
Reassuring	124	67
Non reassuring	61	33

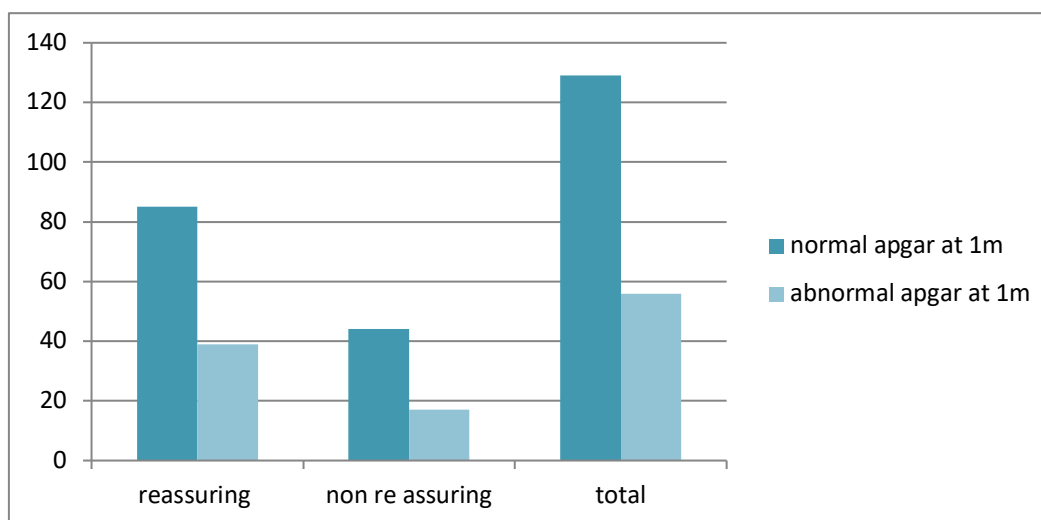
Table 4: Descriptive statistics

	N	Minimum	Maximum	Mean	Standard deviation
Gestational age	185	37.00	40.00	39.1297	0.89347

Therefore mean gestational age is 39 ±0.8

Table 5: CTG and Apgar score at 1 minute

	Apgar score at 1 minute		Total
	Normal	Abnormal	
Reassuring	85	39	124
Non Reassuring	44	17	61
	129	56	185



Graph 3: CTG and Apgar score at 1 minute.

Out of the total 185 cases 122 were reassuring and 61 were non reassuring, 2 were borderline. Out of the 61 non reassuring CTG the APGAR score of 17 (27.9%) babies was abnormal and they required intervention.

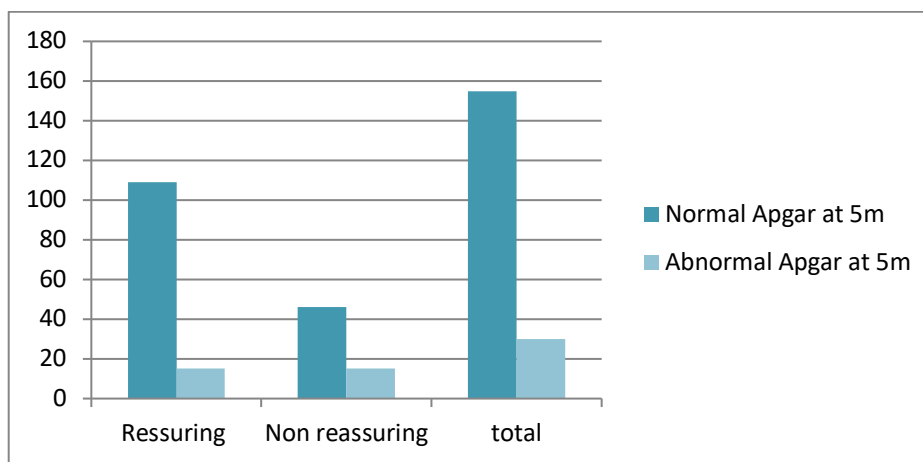
Table 6: Statistical analysis of CTG and Apgar score at 1 minute.

Sensitivity	65.89% (57.36-73.51)
Specificity	30.36% (19.9-43.34)
Positive predictive value	68.55 (59.92-76.06)
Negative predictive value	27.8 (18.19-40.17)
Diagnostic accuracy	55.14 (47.9-62.1)

The sensitivity of the test is 65.89% and specificity is 30.36%.

Table 7: Cardiotocography and Apgar score at 5 minute

	Normal	Abnormal	Total
Reassuring	109	15	124
Non reassuring	46	15	61
	155	30	185



Graph 4: CTG and Apgar score at 5 minute.

Table 8: Statistical analysis of CTG and Apgar score at 5 minute.

Sensitivity	70.32% (62.71-76.95)
Specificity	50% (33.15-66.85)
Positive predictive value	87.9 (81-92.53)
Negative predictive value	24.59 (15.51-36.6)
Diagnostic accuracy	67.03 (59.97-73.39)

Table 9: CTG results and of colour of liquor

	Clear liquor	Meconium stained liquor	Total
Reassuring	99	25	124
Non reassuring	41	20	61
Total	140	45	185

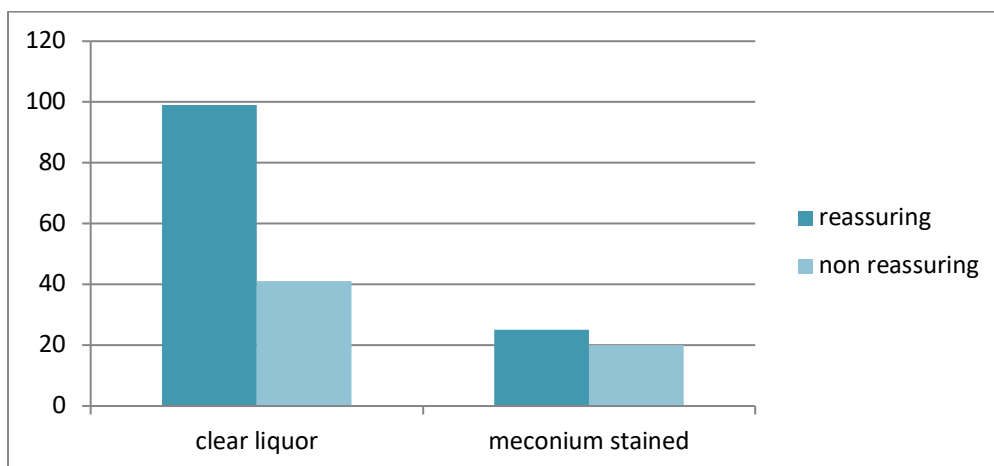
Table 10: Statistical analysis of CTG results and colour of liquor.

Sensitivity	70.71 % (62.7-77.62)
Specificity	44.45% (30.94-58.821)
Positive predictive value	79.8 (71.9-85.95)
Negative predictive value	32.79 (22.33-45.28)
Diagnostic accuracy	64.32 (57.1-70.8)

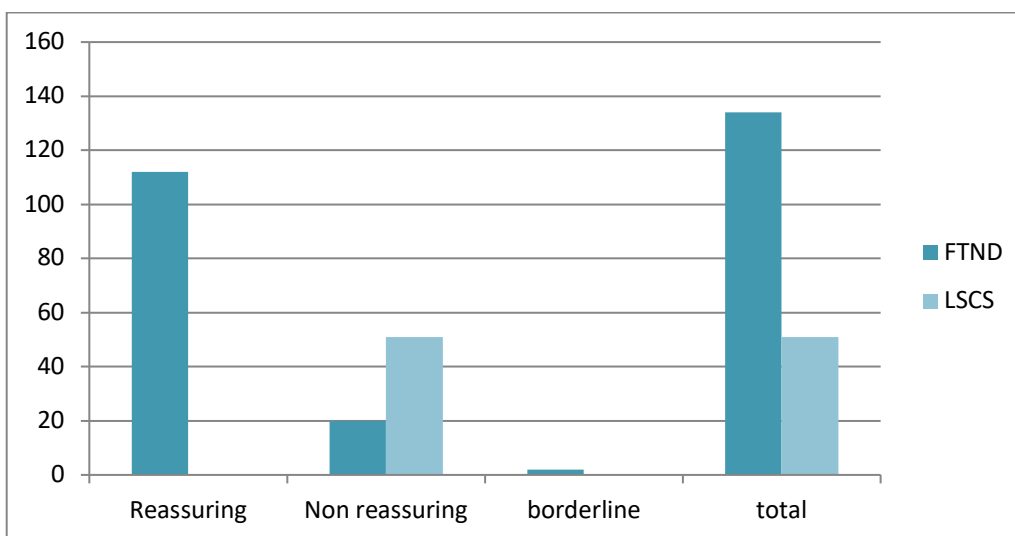
with the above results we found the T value of 1.280, and P value of 0.934 at APGAR score at 1 minute which doesn't seem to be significant. The T value at APGAR score at 5 minute was 2.923 and P value of 0.004 which has high significance.

Table 11: Cardiotocography and mode of delivery

	Full term vaginal delivery	Lower segment caesarean section	Total
Reassuring	112	-	112
Non reassuring	20	51	71
Borderline	2		2
	134	51	185



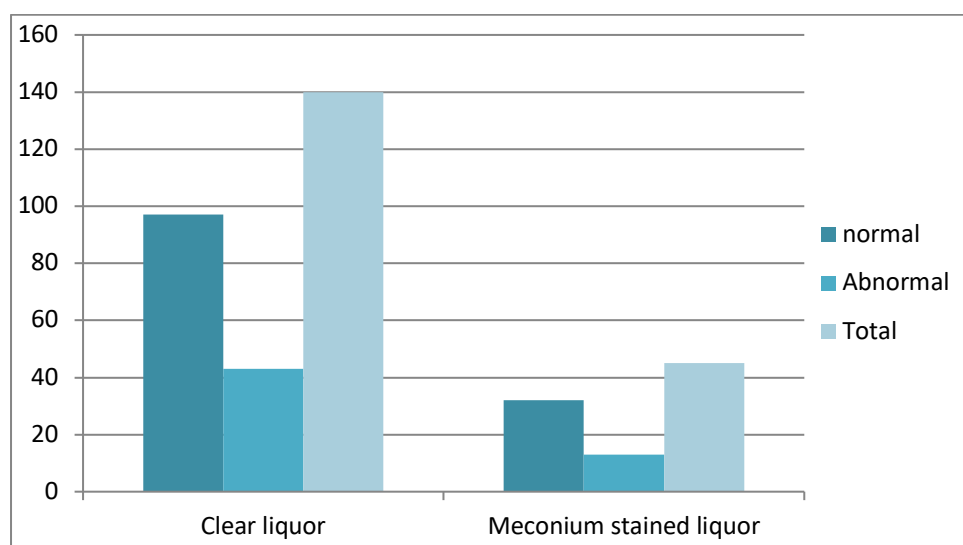
Graph 5: CTG results and colour of liquor.



Graph 6: CTG results and mode of delivery.

Table 12: Interpretation of colour of liquor and Apgar scores at 1 minute .

	Normal	Abnormal	Total
Clear liquor	97	43	140
Meconium-stained liquor	32	13	45
Total	129	56	185



Graph 7: Interpretation of colour of liquor and Apgar scores at 1 minute :

The chi square value is: 0.54 and p value is 0.817, which is not significant.

Discussion:

All pregnancy are important both in terms of maternal and fetal outcomes. In a country like ours where rural population dominates, the people do not take regular ANC, where delivery are conducted in low-resource settings with minimal equipment. To aim for the best outcome with minimal aid is indeed a challenge for the obstetrician. Most of the patient are referred from PHC's, CHC's, or government hospital. Our hospital provides all the care needed, USG, routine and higher blood investigation, CT and MRI, even

though have high cost. Cardiotocography, even though a simple, non-invasive, cheap test, has variable reliability due to its variable readings, subjective variation etc.

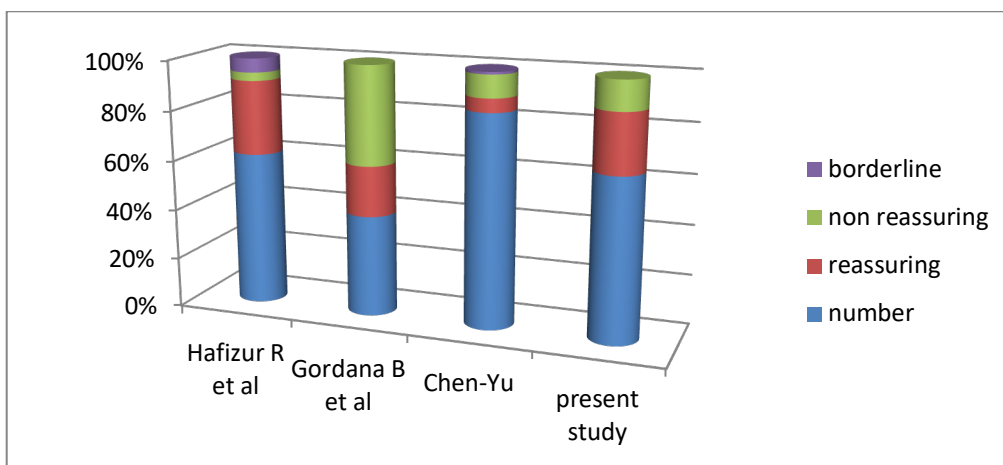
Cardiotocography as an admission test was studied in 185 patients in term pregnancies, with no risk factors, this admission test was the deciding factor for mode of delivery.

We have used the following for this study:

1. Reassuring CTG.
2. Non reassuring CTG.
3. Borderline CTG.

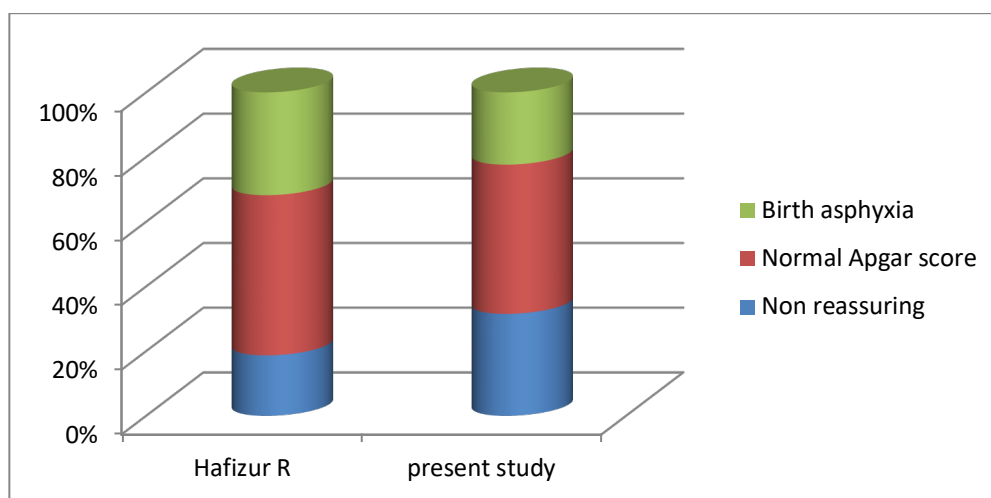
Number of patients and CTG interpretation:

Authors	Number	Reassuring	Non reassuring	Borderline
Hafizur R et al [4]	160	77%	8.6%	14.4%
Gordana B et al [5]	68	33.82%	66.17%	-
Chen-Yu et al [6]	558	35.5%	58.4 %	6.1%
Present study	185	67%	33%	



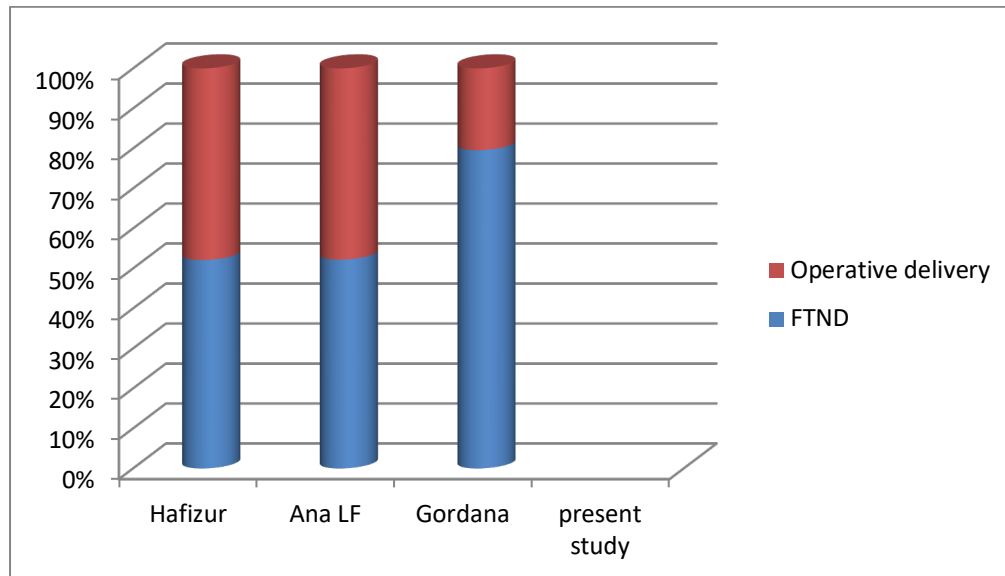
CTG and birth asphyxia

Author	Non reassuring CTG	Normal Apgar score	Birth asphyxia
Hafizur R et al ⁴	23	60.9	39.1%
Present study	46	67.3%	32.6%



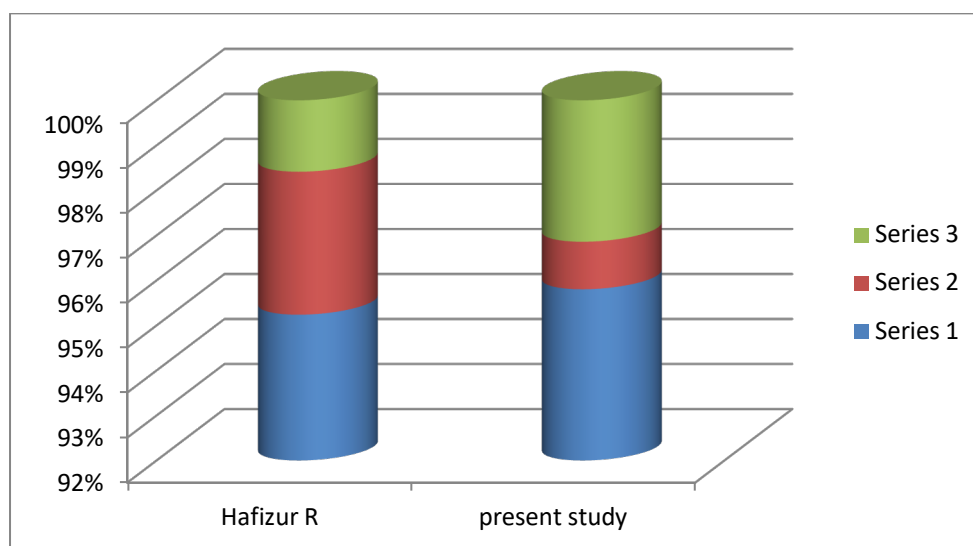
CTG and mode of delivery :

Author	FTND	Operative delivery
Hafizur R et al ⁴	52.2%	48%
Ana LF et al ⁷	52.2%	47.8%
Gordana B et al ⁵	79.41%	20.4%
Present study		



CTG interpretation and meconium staining

Author	Non reassuring	Clear liquor	Meconium stained liquor
Hafizur R et al [4]	20	66.7%	33.3%
Present study	61	67.21%	32.7%



Conclusion

Reactive CTG done as an admission test is fairly a reliable test of fetal well-being. The majority of the patients had reassuring pattern, with good perinatal outcome. Non reassuring CTG will indicate fetal compromise and had an impact on Apgar score at 5 minute, indicating the long term prognosis of the baby. Presence of meconium per se had no effect

on pattern of CTG, and as a whole did not indicate fetal compromise, nor did it alter the perinatal outcome. Operative intervention was more in the patients who had a non-reassuring CTG but the perinatal outcome still remained the same. To conclude cardiotocography should be done as an admission test to know the fetal condition and for timely intervention to prevent birth asphyxia. We

recommend the use of cardiotocography in all the patients.

References

1. Cunningham FG, Lenovo KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY, Twickler JM, Wander GD. Williams Obstetrics. 23rd ed. New York: Mc Graw Hill Medical; 2010. P. 410-443.
2. Chandraharan E, Sabaratnam A. Electronic foetal heart rate monitoring in current and future practice. J Obstet Gynecol India. 2008; 58(2): 121–130.
3. Lekis S, Loghis C, Parayoto N. Use of antepartum and intrapartum cardiography. Clin Exp Obstet Gynecol. 1997; 24:79–81
4. Rahman H, Prachi R, Dutta S. Reliability of admission cardiotocography for intrapartum monitoring in low resource setting. Niger Med J 2012 Jul./Sept ;53(3):145-9.
5. Bogdanovic G, Babovic A, Ljuca D, Grgic G, Milicic JD. Cardiotocography in the prognosis of perinatal outcome. Med Arch 2014 Apr; 68(2):102-5.
6. Chen C, Yu C, Chang C, Lin C. Comparison of a novel computerized analysis program and visual interpretation of cardiotocography. PLoS One 2014;9(12).
7. Nelson KB, Dambrosia JM, Tiny TY, Grehter JK. Uncertain value of electronic fetal monitoring in predicting cerebral palsy. N Engl J Med. 1996; 334:613–618.