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The diagnostic value of the non-reactive NST/non-reactive CTG in high-risk pregnancies

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Abstract
In a country like India, with a large population and limited resources, the antepartum surveillance modalities have to be cost-effective and should be able to screen large population effectively. The non-stress test or the NST has a major role to play in such a situation because of the practical advantages it offers in terms of simplicity and cost-effectiveness. The patients were divided into 2 study groups one containing high risk pregnancies and control group of low risk pregnancies. Non-reactive NST/CTG were used for surveillance from 34 weeks of gestation. Patients were first given a description of the procedure they had to undergo after a preliminary history taking, thorough general examination & obstetric examination. Informed consent was taken. The abnormal test group showed statistically increased incidence of fetal distress during labour $p< 0.006$ in NST and 0.007 in CTG respectively. Meconium stained amniotic fluid were significant $p<0.01$ in NST and $p<0.01$ in CTG respectively.

Keywords: Non-reactive NST, Non-reactive CTG, High-risk pregnancies

Introduction
With the onset of normal labor, a fetus embarks on the most perilous journey it will undertake in its lifetime. Although widely considered the best method of delivery for the mother and the baby, a vaginal birth is not bereft of risks. Although the introduction of intrapartum fetal surveillance has not been able to make this journey any easier, it has certainly helped in making it much safer than it has ever been [1].

The antepartum assessment of foetal well-being has become an integral part of the management of high risk pregnancies. The primary purpose of the various antepartum surveillance techniques is to prevent fetal morbidity and mortality [1]. Hence different biophysical techniques have been devised to identify those babies that are at risk. The early identification of the fetus at risk from uteroplacental insufficiency due to maternal risk factors, placental disorders or foetal disease has become a major goal of perinatal medicine.

History taking and physical examination of a pregnant lady remains the foremost step in the antepartum assessment of fetal status. Fetal kick counts, though one of the oldest methods, is still commonly used for foetal surveillance [2].

Routine electronic fetal monitoring is accepted in high risk women but low risk women too require some reliable objective assessment to optimize the outcome.

Intrapartum fetal morbidity and mortality is not uncommon in a low risk population. Any fetus has the potential risk of intrapartum hypoxia which may lead to birth insult. If for some reason continuous monitoring cannot be applied, an alternative is the cardiotocography.

The CTG may of benefit if the mother did not have an adequate antenatal care or if one to one midwifery care is not possible. The mother may ask the question, ` Is my baby alright?', and this is best answered with an admission CTG [3, 4]

In a country like India, with a large population and limited resources, the antepartum surveillance modalities have to be cost-effective and should be able to screen large population effectively. The non-stress test or the NST has a major role to play in such a situation because of the practical advantages it offers in terms of simplicity and cost-effectiveness. NST is a test that records graphically the fetal heart activity and uterine activity continuously through uterine quiescence and contraction with foetal movement. It is not only simple and inexpensive; it is also noninvasive and is easily performed and interpreted. It also consumes less time and has no contraindications for testing and more importantly it can be used to screen a large population quickly in an outpatient setting and can be performed by trained paramedical staff [5, 6].

There is a considerable body of clinical literature that supports the use of the NST in the

management of high-risk pregnancies. The present study examines the role of non-reactive NST/non-reactive CTG in the antepartum surveillance of high risk pregnancies and its effectiveness in predicting the different variables of perinatal outcome.

Methodology

The high risk groups and low risk group population were selected by history, clinical examination and relevant investigation. The study population consists of 229 women. Out of which 130 high risk patients and 99 low risk patients of Booked & unbooked cases from OBG OPD, wards, prelabour & labour room, Chinmaya Mission Hospital, Bangalore.

The inclusion criteria

- Patients of all age group who gave consent.
- Singleton non-anomalous pregnancies of 34 weeks or more Weeks gestation.
- Only the NST or CTG performed within 7 days prior to delivery and at the admission for labour respectively were considered for fetal outcome.
- Patients with clinically suspected IUGR, pre-eclampsia, gestational diabetes mellitus, PIH (gestational hypertension), chronic hypertension, previous fetal demise, decreased or absent fetal movement,3rd trimester bleeding, prolonged pregnancy, cardiovascular disease, rhesus is o-immunization, previous caesarean section, altered liver function test, adolescent pregnancy and Oligohydramnios.
- Preterm labour more than 34 weeks.

Exclusion criteria

- Sedative usage 24hrs before testing.
- Major congenital anomaly of the fetus detected by routine ultrasound screening.

Procedure of study

The patients were divided into 2 study groups one containing high risk pregnancies and control group of low risk pregnancies. Non-reactive NST/CTG were used for surveillance from 34 weeks of gestation.

Patients were first given a description of the procedure they had to undergo after a preliminary history taking, thorough general examination & obstetric examination. Informed consent was taken.

Later patients were subjected to the test using sonic aid fetal monitor at speed of 3cm/min for 20 minutes after ensuring maternal hydration and food intake.

NST was recorded weekly, biweekly and on alternate days or even daily basis depending on the high risk factor and was followed up.

CTG recording of fetal heart rate and uterine contraction in labor for a period of 20 minutes was performed.

The patient was placed in lateral recumbent position with pillow under one of her hips to displace the weight of the uterus away from the inferior venacava.

- In patients with non-reactive test, a 20 minutes extended strip was taken after the following actions:
- Repositioning of patients.
- Discontinuation of uterine stimulants.
- Vaginal examination (patients in labour).
- Administration of oxygen to the mother.

Results

Table 1: Parity Specific Distribution of High Risk (n=130) and Low Risk (n=99) Pregnancy Cases

	Parity	High Risk	Low Risk	Total	p Value
NST Results	Primigravida	28	19	47	0.0033
	Gravida2	31	8	39	0.3220
	Multigravida	23	2	25	0.0191
CTG Results	Primigravida	25	43	68	0.3130
	Gravida2	8	20	28	0.1350
	Multigravida	15	7	22	0.0036

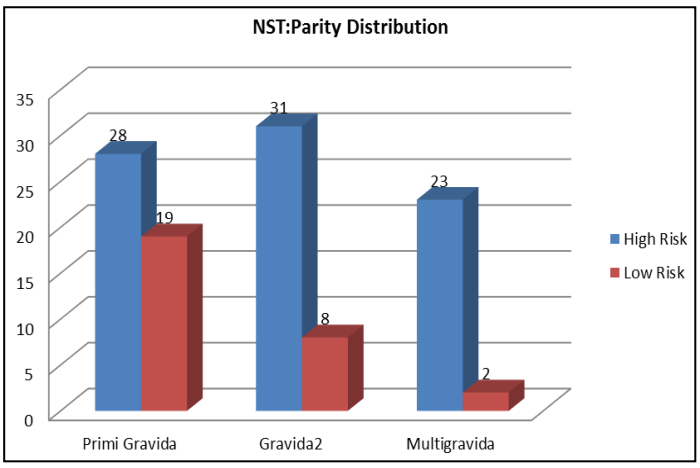

Fig 1: Parity Distribution of High Risk and Low Risk in NST

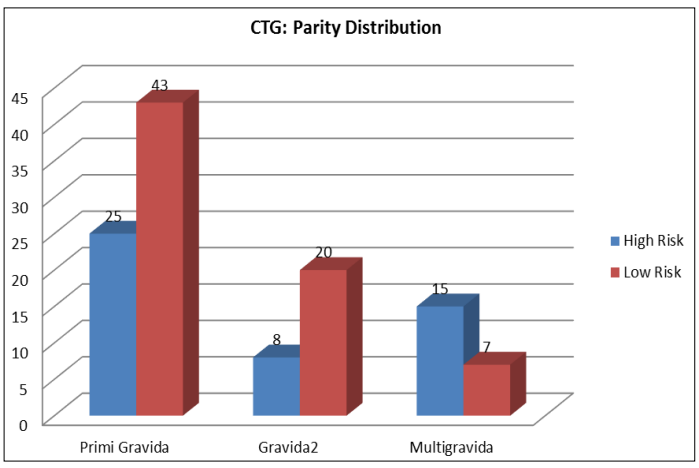

Fig 2: Parity Distribution of High Risk and Low Risk in CTG

The parity distribution of patients in both the groups is shown in the above table figures. Primigravida was observed more frequently in low risk pregnancy but more gravida 2 in high risk pregnancy followed by primigravida. The distribution of primigravida and multigravida between the two groups is significant (p=0.0033 and 0.0191 respectively) among the NST results and likewise, distribution of multigravida in the CTG results (p=0.0036) was significant.

Table 2: Distribution of Patients according to Mode of Delivery in the two Groups

	Mode of delivery	High Risk	Low Risk	Total	p value
NST result	Lscs	70	14	84	0.0001
	Normal	8	12	20	0.0001
	Outlet Forceps	0	0	0	
	Vacuum	4	3	7	0.2980
	Preterm Vaginal Delivery	0	0	0	
	Total	82	29	111	
CTG result	Lscs	32	20	52	0.0001
	Normal	8	39	47	0.0001
	Outlet Forceps	2	0	2	
	Vacuum	5	11	16	0.4090
	Preterm Vaginal Delivery	1	0	1	
	Total	48	70	118	

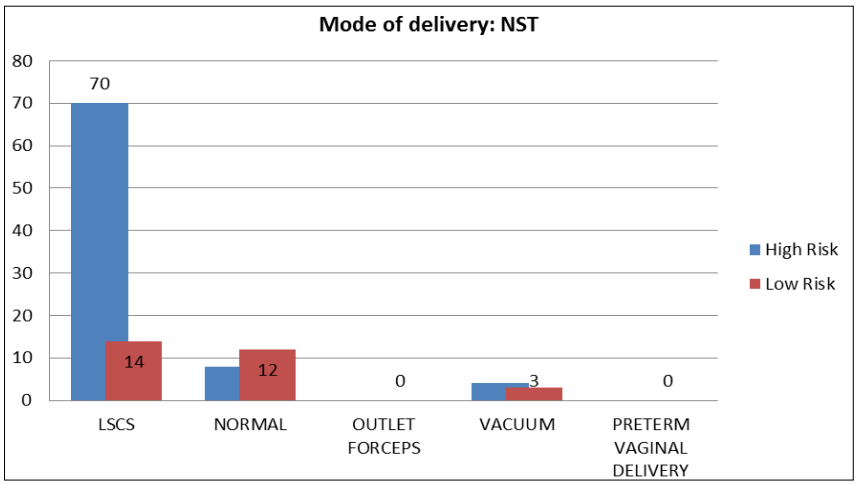

Fig 3: Distribution of Patients according to Mode of Delivery in the Two Groups in non-reactive NST

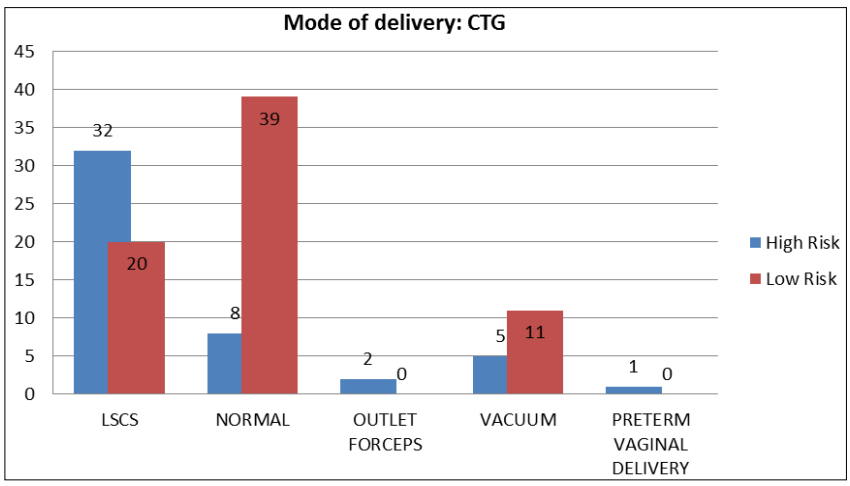

Fig 4: Distribution of Patients according to Mode of Delivery in the Two Groups in Negative CTG

The patients in high risk and low risk groups were followed up for mode of delivery and results are tabulated in the above table.
Out of the 130 high risk patients, 17 patients had vaginal delivery, 11 patients had instrumental delivery and 102 patients underwent LSCS. Out of the 99 low risk patients, 51 patients had vaginal delivery, 14 patients had instrumental delivery and 34 patients underwent LSCS.

The caesarean section rate was as high as 85.36% and 66.6% in high risk non-reactive NST/CTG respectively.
The caesarean section rate was 48.27% and 28.5% in low risk non-reactive NST/CTG respectively.
p value < 0.0001 for non-reactive NST/CTG for high risk and low risk, which suggests that the values obtained in the study are highly significant.

Table 3: Variables during Labour and Delivery in the Two Groups

	Parameters	High Risk	Low Risk	Total	p value
NST Results	Fetal Distress	22	4	26	0.006
	Meconium	13	2	15	0.013
	Cord One Loop	6	3	9	0.094
	Cord Two Loops	2	2	4	NS
CTG Results	Fetal Distress	10	11	21	0.007
	Meconium	6	8	14	0.013
	Cord One Loop	1	4	5	0.057
	Cord Two Loops	3	3	6	NS

Table shows variables in the high risk low risk group. The abnormal test group showed statistically increased incidence of fetal distress during labour $p< 0.006$ in NST and 0.007 in CTG respectively. Meconium stained amniotic fluid were significant $p<0.01$ in NST and $p<0.01$ in CTG respectively. The labour and delivery variables in the low risk group showed that the occurrence of fetal distress and meconium staining of liquor was more common in high risk group than the low risk group.

Discussion

Aparna Hedge *et al.* study had incidence of vaginal delivery of 33.3% in the non-reactive group and 66.7% incidence of operative delivery.

In Vinita Das *et al.* study, patients with abnormal admission test, 60% had LSCS, of which 47.8% had LSCS for fetal distress during labor This study included both high and low risk patients.

In study of Ingemarsson *et al*, had incidence of vaginal delivery of 50% in the non-reactive group and 20% incidence of operative delivery. In the ominous group 40% developed fetal distress. This study had used scalp blood sampling at admission for detection of fetal distress.

In a study by Montan S *et al*, on non-reactive NST in high risk pregnancy LSCS percentage was 41%.

In our study, there were 229 patients. Out of which 130 were high risk. The incidence of vaginal delivery is 13.07%, incidence of instrumental delivery is 8.4% and incidence of operative delivery is 78.46% which is similar to Aparna Hegde and Kamal Buckshee study.

The study indicates that the obstetric intervention (instrumental delivery and LSCS) increases in high risk pregnancy than low risk pregnancy. Increased incidence of obstetric intervention in suspicious admission test group is because of continuous electronic fetal monitoring which again lead to increased obstetric intervention. Increased incidence Of LSCS in pathological admission test group is because of early intervention taken considering that distressed fetus will not withstand the stress of labour.

Table 4: Comparison Table of Mode of Delivery in Relation to the Outcome of Non-reactive NST/CTG Test

Study	Patient	Vaginal delivery		Instrumental delivery		LSCS	
		No.	%	No.	%	No.	%
Aparna Hegde *et al.* [7]	200						
Ominous	12	4	33.3			8	66.7
Vinita Das *et al.* [8]	175						
Abnormal	96	--	--	--	--	28	60
Ingemarsson *et al.* [9]	1041						
Ominous	10	8	50			2	20
Kamal Buckshee *et al.* [10]	100						
Ominous	4	--	--	--	--	4	100
Present study	229						
Non-reactive(high risk)	130	17	13.07	11	8.4	102	78.46

Table 5: Incidence of Fetal Distress in Relation to Admission Test Result in Various Studies

Study	Admission test	No. of patients	No. of patients with fetal distress (%)
Aparna Hedge *et al.* [7]	Ominous	12	9(75)
Ingemarson *et al.* [9]	Ominous	10	4(40)
Kushtagi P *et al.* [11]	Pathological	30	25(83.33)
Present study	Pathological	130	32 (25)

In the high risk test group the incidence of fetal distress in the present study is 25% which is comparable with studies by Ingemarson *et al.* and Montana S.

In the present study, the incidence of fetal distress in the low risk pregnancy pathological admission test is 47% which is comparable with the studies by Aparna Hedge *et al*, Debar *et al.* and Kushtagi P *et al*. Pathological NST/CTG test was false positive in predicting poor perinatal outcome in 65.5% of the patients as determined by Apgar score.

Conclusion

In the present study, also we see that the incidence of fetal distress is increasing from low risk to high risk pregnancy. Thus, non-reactive NST/CTG test can detect fetal distress already present at admission and unnecessary delay in intervention can be avoided in such a case.

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