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Antepartum Fetal Surveillance by Non-Stress Test in High Risk Pregnancy and its Correlation with Perinatal Outcome

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Abstract
During the latter half of twentieth century, various new techniques of antepartum fetal surveillance was invented which contributed significantly to the striking reduction in perinatal mortality and morbidity. To assess the role and efficacy of non-stress test in detecting perinatal outcome in high risk pregnancy and to determine the incidence of prematurity and mode of delivery in relation to NST. The present study was a prospective, observational cohort Study. This Study was conducted from 1 year at Department of Obstetrics and Gynecology, Ramakrishna Mission Seva Pratishthan, Vivekananda Institute of Medical Sciences, 99 Sarat Bose Road, Kolkata-700026. In our study, 101 (40.4%) patients with normal CTG had LSCS, 66 (26.4%) patients with abnormal CTG (suspicious and pathological) had LSCS. 64 (25.6%) patients with normal CTG had spontaneous vaginal delivery (SVD) and 19 (7.6%) patients with abnormal CTG had SVD. NSTs are a valuable tool in the management of high-risk pregnancies. Reactive NSTs generally correlate with favorable perinatal outcomes, while non-reactive NSTs are associated with increased risk of adverse outcomes and may prompt additional intervention. Regular NST surveillance in high-risk pregnancies can help in timely identification of potential issues, improving overall perinatal care.

INTRODUCTION

During the latter half of twentieth century, various new techniques of antepartum fetal surveillance was invented which contributed significantly to the striking reduction in perinatal mortality and morbidity. Any pregnancy can turn into a high-risk one any time during its course. A pregnancy at-risk need to be identified at an earlier state, often in the prenatal period in order to have an effective intervention strategy to deal with its complications[1]. High risk pregnancy requires sophisticated maternal and fetal surveillance to help in management decisions so as to ensure an optimal outcome for both mother and her newborn. Non-stress test (NST) is one such biophysical technique, which is widely used in management of high-risk pregnancies. NST can identify a fetus in jeopardy in-utero. This enables the possibility of an appropriate timely intervention to achieve the most favorable outcome.

In developing countries, maternal mortality has now significantly decreased to enable obstetricians to focus more on fetal health. Initially, the fetus was considered only as an outcome of pregnancy but now a days the fetus is rightfully considered as second patient[2]. Therefore, it also requires as much surveillance as the health of the mother. The main aim of antepartum fetal surveillance particularly in high-risk pregnancy is for the successful identification of the fetus which is at-risk for asphyxia, which is major challenge and one of the primary task of modern obstetric practice[3]. Antepartum surveillance tests to evaluate fetal health have been the focus of intense interest for more than three decades. Continuous electronic monitoring is not possible throughout labor in developing countries due to lack of manpower and resources. Hence, NST will detect at-risk fetuses and further monitoring will be decided on the basis of NST. It is easy to perform. For three decades, non-stress test has been accepted as a primary surveillance tool for pregnancies at-risk for intrauterine death. In addition, NST has been used in combination with ultrasound observations of fetal activity and amniotic fluid value as the bio-physical profile (BPP). More recently, this test has been modified by the addition of vibro-acoustic stimulation (VAS) and/or by Doppler velocimetric studies. Extensive clinical experience has been reported on the use of NST. However, the bulk of the evidence supporting its role in antepartum management is based on the 'Level 2-3' evidence (multiple time series) rather than 'Level 1' evidence (randomized control trials). Despite this, incorporation of NST into high-risk antepartum protocols has been associated with apparent reduction in intrauterine fetal death (IUFD). This study will address the biologic basis of NST in antepartum assessment, its application and interpretation, as well as the best evidence to support its continued use in the care of complicated pregnancies.

MATERIALS AND METHODS

Study Area: Department of Obstetrics and Gynecology, Ramakrishna Mission Seva Pratishthan, Vivekananda Institute of Medical Sciences, 99 Sarat Bose Road, Kolkata-700026.

Study Population: 250 pregnant women who fulfil the 'Inclusion Criteria'.

Study Design: A prospective, observational cohort Study.

Period of Study: 1 year.

Inclusion Criteria: Singleton pregnancy with gestational age ≥32 weeks with any of the following risk factors...

- Hypertensive disorders in pregnancy.
- History of recurrent pregnancy loss.
- Previous history of stillborn pregnancy.
- Diabetes complicating pregnancy, including gestational diabetes.
- Premature rupture of membrane (PROM) and preterm premature rupture of membrane (PPROM).
- Intrauterine growth restriction/Fetal growth restriction (IUGR/ FGR).
- Oligohydramnios.
- Post-dated pregnancy.
- Less fetal movement.
- Anemia.
- Rh-negative pregnancy.
- Previous cesarean section.
- Abnormal presentation.
- Concurrent medical illness like hypertension, diabetes mellitus, thyroid disorders, renal disease, Thrombophilias: Antiphospholipid syndrome, SLE etc.

Exclusion Criteria:

Pregnant women with gestational age <32 weeks.

- Multiple pregnancy.
- APH: a) Placenta previa b) Accidental hemorrhage.
- Eclampsia.
- USG confirmed lethal congenital anomalies.
- Intrauterine fetal death (IUFD).

Statistical Analysis: For statistical analysis, data were initially entered into a Microsoft Excel spreadsheet and then analyzed using SPSS (version 27.0., SPSS Inc., Chicago, IL, USA) and GraphPad Prism (version 5). Numerical variables were summarized using means and standard deviations, while categorical variables were described with counts and percentages. Two-sample t-tests, which compare the means of independent or unpaired samples, were used to assess differences between groups. Paired t-tests, which account for the correlation between paired

observations, offer greater power than unpaired tests. Chi-square tests (χ^2 tests) were employed to evaluate hypotheses where the sampling distribution of the test statistic follows a chi-squared distribution under the null hypothesis; Pearson's chi-squared test is often referred to simply as the chi-squared test. For comparisons of unpaired proportions, either the chi-square test or Fisher's exact test was used, depending on the context. To perform t-tests, the relevant formulae for test statistics, which either exactly follow or closely approximate a t-distribution under the null hypothesis, were applied, with specific degrees of freedom indicated for each test. P-values were determined from Student's t-distribution tables. A p-value ≤ 0.05 was considered statistically significant, leading to the rejection of the null hypothesis in favour of the alternative hypothesis.

RESULTS AND DISCUSSIONS

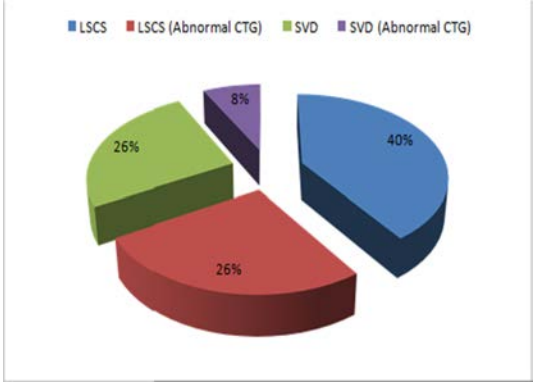

Fig. 1: Diagram of Mode of Delivery

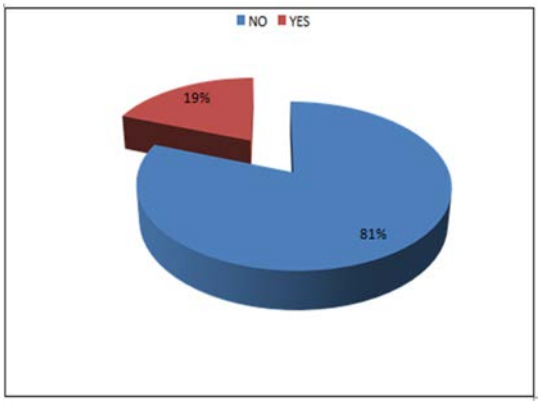

Fig. 2: Diagram of Birth Asphyxia

Out of 218 patients with normal CTG at enrollment 165 (100.0%) patients had Normal CTG finally. At CTG classification final, out of 52 suspicious CTG, 39 (75.0%) patients had Normal CTG and 13 (25.0%) patients had suspicious CTG at enrollment. At CTG classification final, out of 33, 14(42.4%) patients had Normal, 1(3.0%) patients had Suspicious and 18 (54.5%) patients had Pathological at enrollment. Association of CTG Classification at Enrollment vs CTG Classification Final was statistically significant (p<0.0001). In Normal CTG Group, 101 (61.2%) patients had LSCS and 64 (38.8%) patients had vaginal delivery (SVD). In Suspicious CTG Group, 33 (63.5%) patients had LSCS (Abnormal CTG) and 19 (36.5%) patients had SVD (Abnormal CTG). In Pathological CTG group, 33 (100.0%) patients had LSCS (Abnormal CTG). Association of Mode of delivery vs CTG Classification Final was statistically significant (<0.0001). In Normal Group, out of 165 patients, Babies of 6 (3.6%) patients had <7 and babies of 159 (96.4%) patients had ≥7 APGAR score. In Suspicious Group, out of 52 patients, babies of 6 (11.5%) patients had <7 and babies of 46 (88.5%) patients had ≥7 APGAR score. In Pathological Group, out of 33 patients, babies of 27 (81.8%) patients had <7 and babies of 6 (18.2%) patients had =7 APGAR score . Association of APGAR Score at 1 minute vs CTG Classification Final was statistically significant (p<0.0001). In Normal Group, out of 165 patients, babies of 6 (3.6%) patients had <7 and babies of 159 (96.4%) patients had ≥7 APGAR score. In Suspicious Group, out of 52 patients, babies of 6 (11.5%) patients had <7 and babies of 46 (88.5%) patients had ≥7 APGAR score. In Pathological Group, out of 33 patients, babies of 27(81.8%) patients had <7 and babies of 6 (18.2%) patients had ≥7 APGAR score. Association of APGAR SCORE at 5 minutes vs CTG Classification Final was statistically significant (p<0.0001).

Non-stress test is a biophysical technique of antepartum fetal surveillance which is widely used in the management of high risk pregnancies. The goal of NST is to prevent fetal jeopardy that may result from fetal hypoxia and metabolic acidosis. The emphasis is on improving fetal birth outcome by detection of fetal hypoxia, therefore preventing subsequent academia and cell damage, before it leads to perinatal morbidity and mortality. Freeman and Lee (1975) and colleagues introduced the non-stress test to describe the fetal heart rate acceleration in response to fetal movement as a sign of fetal wellbeing. The non-stress test is based on the hypothesis that the heart rate of the fetus that is not academic as a result of hypoxia or neurological depression will temporarily accelerate in response to fetal movement. Fetal movements during testing are identified by maternal perception and recorded but as hypoxia develops, fetal heart rate acceleration diminishes. Although there are several studies on Indian antenatal high risk patients studying the perinatal outcomes during labor but there are very few studies following the mode of delivery and perinatal outcomes in high risk patients during the antenatal period. This outlines the need of highlighting the importance of non-stress test and creating awareness among the obstetricians regarding it.

Table 1: Association Between CTG Classification at Enrollment: CTG Classification Final

	CTG Classification Final			
CTG Classification at Enrollment	**Normal**	**Suspicious**	**Pathological**	**Total**
Normal	165	39	14	218
Row %	75.7	17.9	6.4	100.0
Col %	100.0	75.0	42.4	87.2
Suspicious	0	13	1	14
Row %	0.0	92.9	7.1	100.0
Col %	0.0	25.0	3.0	5.6
Pathological	0	0	18	18
Row %	0.0	0.0	100.0	100.0
Col %	0.0	0.0	54.5	7.2
TOTAL	165	52	33	250
Row %	66.0	20.8	13.2	100.0
Col %	100.0	100.0	100.0	100.0

Table 2: Association Between Mode of Delivery: CTG Classification: Final

	CTG Classification: FINAL			
Mode of Delivery	**Normal**	**Suspicious**	**Pathological**	**Total**
LSCS	101	0	0	101
Row %	100.0	0.0	0.0	100.0
Col %	61.2	0.0	0.0	40.4
LSCS (Abnormal CTG)	0	33	33	66
Row %	0.0	50.0	50.0	100.0
Col %	0.0	63.5	100.0	26.4
SVD	64	0	0	64
Row %	100.0	0.0	0.0	100.0
Col %	38.8	0.0	0.0	25.6
SVD (Abnormal CTG)	0	19	0	19
Row %	0.0	100.0	0.0	100.0
Col %	0.0	36.5	0.0	7.6
TOTAL	165	52	33	250
Row %	66.0	20.8	13.2	100.0
Col %	100.0	100.0	100.0	100.0

Table 3: Association Between APGAR Score at 1 Minute and CTG Classification: Final

	CTG Classification : FINAL			
APGAR Score At 1 Minute	**Normal**	**Suspicious**	**Pathological**	**TOTAL**
<7	6	6	27	39
Row %	15.4	15.4	69.2	100.0
Col %	3.6	11.5	81.8	15.6
≥7	159	46	6	211
Row %	75.4	21.8	2.8	100.0
Col %	96.4	88.5	18.2	84.4
TOTAL	165	52	33	250
Row %	66.0	20.8	13.2	100.0
Col %	100.0	100.0	100.0	100.0

Table 4: Association Between APGAR Score at 5 Minutes and CTG Classification: Final

	CTG Classification: FINAL			
APGAR Score at 5 minutes	**Normal**	**Suspicious**	**Pathological**	**TOTAL**
<7	6	6	27	39
Row %	15.4	15.4	69.2	100.0
Col %	3.6	11.5	81.8	15.6
≥7	159	46	6	211
Row %	75.4	21.8	2.8	100.0
Col %	96.4	88.5	18.2	84.4
TOTAL	165	52	33	250
Row %	66.0	20.8	13.2	100.0
Col %	100.0	100.0	100.0	100.0

In our study conducted at Ramakrishna Mission Seva Pratishthan, VIMS, a total of 250 antenatal patients with high risk factors with gestational age ≥32 weeks were included. The patients with singleton pregnancy who admitted through outpatient department or through emergency, after considering the inclusion and exclusion criteria, were included in the study. After thorough assessment in the antenatal period, outcomes of each pregnancy in terms of mode of delivery in relation to NST, neonatal outcomes and various other factors were studied. In our study, we found that out of 250 patients 58 (23.2%) patients were ≤20 years old, 80 (32.0%) patients were 21-25 years old, 80 (32.0%) patients were 26-30 years old and 32 (12.8%) patient were 31-35 years old. So, most of the patients are in 20-30 years age group which is a usual age of reproduction in India. But there is a rising trend of higher maternal age of reproduction due to increase age of marriage, employment and empowerment of women. According to, 127 (50.8%) patients were primigravida, 59 (23.6%) patients were second gravida, 57 (22.8%) patients were third gravida, 5 (2.0%) patients were fourth gravida and 2 (0.8%) patients were fifth gravida. In our study, 127 (50.8%) patients were P0+0, 15 (6.0%) patients were P0+1, 17 (6.8%) patients were P0+2, 1 (0.4%) patients were

P0+3, 44 (17.6%) patients were P1+0, 22 (8.8%) patients were P1+1, 2 (0.8%) patients were P1+2, 1 (0.4%) patients were P1+3, 18 (7.2%) patients were P2+0, 1 (0.4%) patients were P2+1, 1 (0.4%) patients were P3+0 and 1 (0.4%) patients were P4+0. So we can say primigravida patients were 50.8% and multigravida patients were 49.8%. Shah[4] in a related study found that 41.8% women were primigravida and 58.2% were multigravida and Deshpande[5] included 51% primi patients in their study. In our hospital set up generally every patient is a booked case. So, no unbooked patients were included in our study (100% booked case). In, it is shown that the mean age (mean±s.d.) of patients was 24.7840±4.5954 years. The minimum age was 18 years and the maximum age was 34 years. Singh[6] found that the mean age of patients was 25.09±3.78 years and Swati Garg[7] found that majority of study subjects were in the age group of 26-30 years (n=74., 73.3%). It is shown that the mean gestational age at Enrollment (mean±s.d.) of the patients was 35.3556±2.0857 weeks. The minimum gestational age at enrollment was 32 weeks and maximum age at enrollment 40 weeks and 1 day. On the other hand, the mean gestational age at termination of pregnancy (mean±s.d.) of patients was 37.8540±1.4561 weeks. The gestational age at termination ranges from 33 weeks 4 days to 40 weeks 3 days. Agrawal[8] found that mean age was 24.32±4.37 (range 19-35) years and mean age at enrollment was 35.23±1.78 weeks. Jamatia[9] in similar study found that majority of women were admitted at 37-38 weeks period of gestation. Swati Garg[7] found the period of gestation in 74 (73.3%) subjects was 37-38 weeks. We found that among 250 patients, 40 (16.0%) patients had anemia. 19 (7.6%) patients had Rh-negative pregnancy, 11 (4.4%) patients had abnormal presentation, 34 (13.6%) patients had less fetal movements, 17 (6.8%) patients had post-dated pregnancy, 16 (6.4%) patients had bad obstetric history, 24 (9.6%) patients had previous LSCS, 38 (15.2%) patients had IUGR/FGR, 27 (10.8%) patients had Oligohydramnios, 45 (18.0%) patients had diabetes mellitus, 50 (20.0%) patients had hypertension and 36 (14.4%) patients had history of PROM/PPROM. So in our study the most common risk factor was hypertension followed by diabetes mellitus. It should be noted that in our study few patients had more than one risk factors. The study conducted by Mehta[10] found that the most common high risk factor were PIH (60%) followed by post-dated pregnancy (21%) and gestational diabetes mellitus was the most common risk factor in the high-risk group (n=22., 43.1%) in the study conducted by Swati Garg[7]. In our study, at enrollment, out of 250 patients, 218 (87.2%) patients had normal, 14 (5.6%) patients had suspicious and 18 (7.2%) patients had pathological CTG. In final CTG of our study, 165 (66.0%) patients had Normal, 52 (20.8%) patients had Suspicious and 33 (13.2%) patients had pathological CTG. The mean number of CTG (mean±s.d.) done to the patients were 3.2400±1.2794. Minimum CTG done was one and maximum CTG done was six. In our study, out of 218 patients with normal CTG at enrollment 165 (100.0%) patients had normal CTG finally. From the same table we can see that out of 52 suspicious CTG in final CTG classification group, 39 (75.0%) patients had Normal CTG and 13 (25.0%) patients had suspicious CTG at enrollment and out of 33 pathological CTG in final CTG classification group, 14 (42.4%) patients had Normal, 1 (3.0%) patients had Suspicious and 18 (54.5%) patients had Pathological at enrollment. The association of CTG Classification at Enrollment vs CTG Classification Final was statistically significant (p<0.0001). At enrollment there was more no of normal CTG and at final CTG there was significant increase in abnormal CTG (suspicious and pathological). Jamatia[9] mentioned that out of 100 patients, a total of 68 (68%) women were found to have reactive NST while 32 (32%) women had non-reactive NST. Agrawal[8] found that Non-reactive NST was seen in 52 (41.6%) patients. Verma[11] found that 82% had normal NST while 18% shows abnormal NST and Lohana[12] found that the incidence of reactive test was 85% and that of Non-reactive NST was 15%. As the gestational age advances the incidence of NR NST is more. Post-dated pregnancy (gestation >40 weeks) is found to be an important factor for NR NST. We found that in Normal Group, the mean number of CTG (mean±s.d.) done was 3.3939±1.1245. In Suspicious Group, the mean number of CTG (mean±s.d.) done was 3.4423±1.3197. In Pathological Group, the mean number of CTG (mean±s.d.) done was 2.1515±1.4388. Difference of mean number of CTG with three CTG classification final was statistically significant (p<0.0001). The mean no of CTG done was higher in Normal CTG patients at enrollment. It was found that total 167 (66.8%) patients underwent LSCS. Out of them 101 (40.4%) patients with normal CTG underwent LSCS and 66 (26.4%) patients with suspicious or pathological CTG (abnormal) had caesarean delivery. The patients with normal CTG underwent LSCS due to previous LSCS, abnormal presentation, bad obstetrics history, PPROM/PROM or hypertension. Additional, in our study 83 patients underwent vaginal delivery. Out of them, 64 (25.6%) patients with normal CTG had spontaneous vaginal delivery (SVD) and 19 (7.6%) patients (Abnormal CTG) had SVD. So total number of vaginal delivery out of 250 patients were 83 (33.2%). So we can conclude that caesarean delivery rate is higher in high risk pregnancy and it is more in abnormal CTG group. We also found that association of Mode of Delivery vs CTG Classification Final was statistically significant (<0.0001). It means pathological CTG patients underwent more LSCS in comparison to the other two CTG group. In the study of Jamatia[9], out of 68 NST

reactive cases, forty six (67.64%) women delivered vaginally and 22 (32.35%) underwent cesarean section and in non-reactive 32 cases, nine (28.12%) women delivered vaginally and 23 (71.87%) women underwent cesarean section which is statistically significant (p<0.05). They inferred that the major goal of antepartum fetal surveillance is an appropriate and timely identification of fetuses at risk of morbidity and mortality and thus unnecessary delay in interventions can be avoided and hence a better perinatal outcome could be achieved. An equally important goal is to avoid unnecessary intervention in an uncompromised fetus. Singh[6] in their study found that, in 14 cases (23.3%) with reactive NST underwent lower caesarean section (LSCS) whereas 36 cases (90%) with non-reactive NST underwent LSCS. They concluded NST tells about acute fetal hypoxia and decision to delivery time can be made for those patients with fetal distress so that a major improvement in the outcome among parturient can be achieved with abnormal NST results. An abnormal NST should alert the clinician of fetal compromise and has to be followed up by other biophysical tests. Lohana[12] found mode of delivery was related to results of Non stress Test in terms of maximum vaginal delivery in Reactive groups, Operative deliveries which occurred in the Reactive groups were also due to indications other than fetal distress. Caesarean section rate is slightly higher in non reactive NST. However, Shah[4] reported that NST was reactive in 71.7% cases and non reactive in 28.3% cases. LSCS was required in 6.3% of women with reactive NST versus 29.5% cases in non reactive group Out of 250 babies delivered in our study, 48(19.2%) babies had birth asphyxia (Table 1, Diag. 1), 50(20.0%) babies needed neonatal resuscitation and babies of 57 (22.8%) patients had NICU admission In normal CTG group, babies of 7 (4.2%) patients had birth asphyxia., in suspicious Group, babies of 13 (25.0%) patients had birth asphyxia and in Pathological Group, babies of 28 (84.8%) patients had birth asphyxia. Association of Birth Asphyxia vs CTG Classification Final was statistically significant (p<0.0001). Patients with pathological CTG had higher incidence of birth asphyxia in comparison to suspicious and normal CTG groups in decreasing order. In our study, in normal CTG group, babies of 9 (5.5%) patients needed neonatal resuscitation In suspicious group, babies of 13 (25.0%) patients needed neonatal resuscitation and in Pathological Group, babies of 28 (84.8%) patients needed neonatal resuscitation. Therefore, association of Neonatal Resuscitation vs CTG Classification Final was statistically significant (p<0.0001). It denotes that pathological, suspicious and normal CTG indicates higher chances of need of neonatal resuscitation in decreasing order. Similarly, we found that in normal CTG group, babies of 16 (9.7%) patients required NICU admission., In suspicious group, babies of 13 (25.0%) patients required NICU admission and in pathological CTG group, babies of 28 (84.8%) patients required NICU admission. So our study shows association of NICU Admission vs CTG Classification Final was statistically significant (p<0.0001). Normal, suspicious and pathological CTG indicates more need of NICU admission in increasing order. Himabindu[13] found NST can be taken as a screening method for assessment of fetal well being and optimum time of delivery. Thakur Archana[14] found that Neonatal admission to neonatal intensive care (NICU) was required in 76.2% of patients with an abnormal test result while only 36.5% of patients with the normal test results were subjected to NICU admission and this was statistically significant (x2=10.76., p<0.01). The results suggested that electronic fetal monitoring (CTG) is mandatory in all high risk obstetric cases on admission. Agarwal[15] concluded every neonate born to the mother with non-reactive NST had severe acidosis and required NICU admission. Gupta[16] concluded that there is statistically significant role of reactivity of CTG and NICU admission. Cardiotocography is the best non invasive screening test to evaluate the fetal health and to predict the perinatal outcome in high risk pregnancy. Incidence of fetal distress, MSL, abruption, low birth weight and NICU admission was more frequent in those cases that have non reactive traces. In Normal CTG group, babies of 6 (3.6%) patients had <7 APGAR score and babies of 159 (96.4%) patients had ≥7 APGAR score at 1 minute)., In suspicious group, babies of 6 (11.5%) patients had <7 and babies of 46 (88.5%) patients had ≥7 APGAR score and In pathological group, babies of 27(81.8%) patients had <7 and 6(18.2%) patients had ≥7 APGAR score. Association of APGAR Score AT 1 MIN vs CTG Classification Final was statistically significant (p<0.0001). APGAR score is better in normal CTG group. It was found that in Normal CTG Group, 6 (3.6%) patients had <7 and 159 (96.4%) patients had ≥7 APGAR score at 5 minutes., In Suspicious Group, 6 (11.5%) patients had <7 and 46 (88.5%) patients had ≥7. In Pathological Group, 27(81.8%) patients had <7 and 6(18.2%) patients had ≥7. Association of APGAR Score AT 5 MIN vs CTG Classification Final was statistically significant (p<0.0001). (Table 2-4, Diag. 2). Pathological CTG is associated with poor APGAR score at 5 minutes. Jamatia[9] reported that APGAR score >7/10 at 1 and 5 minutes was found in 64(94.11%) newborns in reactive NST group and 22(73.33%) newborns in non reactive NST group which is statistically significant (p<0.05). Nine (13.23%) newborns were admitted in reactive NST group and 17(56.66%) in non-reactive NST group. They concluded that the major goal of antepartum fetal surveillance is an appropriate and timely identification of fetuses at risk of morbidity and mortality and thus unnecessary delay in interventions can be avoided and hence a

better perinatal outcome could be achieved. An equally important goal is to avoid unnecessary intervention in an un compromised fetus. Lohana[12] found that APGAR score <7 at 5 minutes had increased incidences in the non reactive group. Tambat[17] found that Patients were followed up with serial Umbilical artery Doppler and NST. Perinatal outcome was correlated with the last Doppler and NST within 7 days prior to delivery. Perinatal outcome is worst in patients with both NST and Doppler are abnormal and best among patients with both normal NST and Doppler. Doppler predicts fetal compromise earlier as compared to NST. Verma[11] reported similar result. So after discussing statistical analysis and results of our study we found that antepartum surveillance by non-stress test is very important for high risk patients. It can predict fetal hypoxia and can alert us to take timely intervention for better fetal outcomes in the means of birth asphyxia, need for neonatal resuscitation, NICU admission. It can also predict poor APGAR scores in neonates. So non-stress test or CTG has very important role in antepartum fetal surveillance in high risk pregnancy and as it is very simple, cost effective, easy to interpret it should be done in all high risk patients preferably after 32 weeks of gestation or earlier if needed. It is a very important screening test. Fetal surveillance may be additionally done with bio-physical profile, ultrasonography, Doppler study as per the need and according to the risk factors.

CONCLUSION

Our main goal of antepartum fetal surveillance in high risk pregnancy is timely detection of fetal jeopardy from fetal hypoxia and metabolic acidosis so that intervention can be taken at appropriate time, thus unnecessary delay and perinatal morbidity and mortality can be avoided. Our goal is also to avoid needless interventions in a non-compromised healthy fetus. In our study, LSCS were more in case of abnormal NST. Low APGAR score at 1 minute and 5 minutes, need for neonatal resuscitation and NICU admission were more with abnormal NST. We also conclude that if NST is normal, then the chances of fetal hypoxia in patients with high risk factors are less. NST is a simple, inexpensive and non-invasive test. It is an excellent screening test of fetal well ness rather than fetal illness. It is good option to be used as primary screening test for high risk antenatal patients and for taking early intervention measures for reducing perinatal morbidity and mortality. We also conclude that additional tests like biophysical profile and obstetrics color Doppler are highly desirable in abnormal NST group prior to taking any intervention and to further improve obstetric outcome. Thus, antenatal fetal surveillance by NST in high risk pregnancy is a useful noninvasive tool to determine early fetal distress.

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