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Original Research Article

Correlation of non-stress test with fetal outcome in term of apgar score: a prospective observation study

Balveer Jakhar*, Archana Bamaniya, Anuj Kumar Sharma, Radha Rastogi, Kalpesh Patel

Department of Obstetrics and Gynecology, RNT Medical College, Udaipur, Rajasthan, India

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***Correspondence:**
Dr. Balveer Jakhar,
E-mail: drjakharbalveer@gmail.com

ABSTRACT

Background: The objectives of antepartum fetal surveillance are to prevent fetal death and avoidance of unnecessary intervention. This study using NST as a tool for routine antepartum fetal surveillance is we will be trying to catch up those fetuses who might be at risk in womb and provide prompt intervention in otherwise considered normal pregnancies without any obvious high-risk factor thus giving the best outcome in mothers.
Methods: The objective of this study was to evaluate the correlation of the non-stress test with fetal outcome in pregnancies from 37-42 weeks of gestation. This was a prospective observational study at RNT Medical college Udaipur (Rajasthan) from November 2021 to March 2022. This study included 100 normal pregnant mothers from 37 weeks to 42 weeks who were subjected to NST.
Results: The parameters of poor fetal outcome like apgar score <7 at 5 minutes had increased incidences in the non-reactive group.
Conclusions: This study suggests that the NST was found to be a good predictor of the healthy foetus even in normal pregnancies between 37-42 weeks of gestation and the probability of an adverse outcome such as poor Apgar score increases with a non-reactive strip.

Keywords: Antepartum fetal surveillance, NST, APGAR

INTRODUCTION

According to American College of Obstetrician and Gynaecologists and American Academy of Pediatrics (2012) the objectives of antepartum fetal surveillance are to prevent fetal death andavoidance of unnecessary intervention. NST is a method used to test fetal wellbeing before the onset of labor. The test is named "non-stress" because no stress is placed on the fetus during test. Among all available tests this is simple to be done, can be repeated, non-harmful, cost effective, handy and low maintenance. It is most widely used primary testing method for assessment of fetal well-being.

A prenatal non-stress test functions in overall antepartum surveillance with ultrasound as a part or component of the biophysical profile. The presence of fetal movements and fetal heart rate acceleration is the most critical feature of the non-stress test. It is a non-invasive test used for the surveillance of high-risk pregnancies when the fetus is judged clinically to be at risk for hypoxemia or increased risk of death.

The Non-Stress Test (NST) is an assessment tool used from 32 weeks of gestation to term to evaluate fetal health through the use of electric fetal monitors that continuously record the fetal heart rate (FHR). The test is used to determine if a fetus is at risk for intrauterine death or neonatal complications, usually secondary to high-risk pregnancies or suspected fetal hypoxemia. The frequency of use is based on clinical judgment, but is common because it is non-invasive and presents a low maternal and fetal risk; however, the test does not hold predictive value and only indicates fetal hypoxemia at time of the test.

Basic pattern recognition and interpretation

Characteristic of normal heart rate pattern, Baseline heart rate-110-160bpm, Baseline variability >5bpm, no. of acceleration >2 in 20 min period, Number of deceleration-absent or early deceleration, fetal outcome vigorous with Apgar score >7.

Interpretation

Reassuring

Two or more FHR acceleration of 15 bpm for 15 seconds in 20 min usually associated with episodes of fetal movement and normal baseline variability more than 5 bpm.[4]

Non-reassuring

Any tracing with no FHR acceleration or inadequate acceleration that is less than 15 bpm or a tracing with decreased FHR variability.

Sinusoidal

Super imposed or non-reassuring pattern. It is smooth undulating FHR pattern with a frequency of 2-5 cycles/min. Long Term variability and amplitude of 5-15 beats/min with the absence of acceleration or fixed or flat short-term variability. Oscillation of sinusoidal waves from above or below the baseline. Unsatisfactory: tracing not adequate for interpretation.

Salutatory

Rapidly recurring couplets of acceleration and deceleration causing relatively large oscillation of baseline FHR.

Aims and objectives

Assessment of fetal well-being during antenatal period using NST in pregnancies between 37 to 42 weeks of gestation. Study the role of NST in management of pregnancies between 37 to 42 weeks of gestation. To study the correlation of NST at time of admission and APGAR score at 1 and 5 minutes.[5]

METHODS

The present prospective study was conducted at Rajkiya Pannadhay Mahila Chikitsalya Udaipur in department of Obstetrics and Gynaecology from period of November 2021 to March 2022. The study was done on 100 cases. 50 Normal pregnancies with reassuring NST, were taken randomly as control group and 50 normal pregnancy cases with abnormal NST, were taken randomly as study group. The subjects were explained the test, need of the test, done from 37 to 42 weeks of gestation.

Non-stress test

This test was performed in patients, admitted to wards or labor room. Test done for 20 minutes. If a reassuring test failed to occur within these 20 minutes, it was extended up to 40 minutes for non-reactive traces.[7] The NSTs were classified into 2 groups based on the presence or absence of at least 2 FHR accelerations of 15 bpm lasting for 15 seconds in a 20 minutes reading into reactive or normal test or reassuring test. Non-reactive or abnormal test or non-reassuring test.[7]

Definition of a reassuring NST

Two or more accelerations that peak at 15 bpm or more, each lasting for 15 seconds or more, within 20 minutes of beginning the test.[6]

Definition of a non-reassuring NST

At the end of 40 minutes if there were no qualifying accelerations, baseline variability less than 5 bpm, late decelerations with spontaneous uterine contractions, and variable decelerations, repetitive and lasting for more than 30 seconds.[6]

Inclusion criteria

All patients who were in labour at time of admission.

Exclusion criteria

Pregnancy complicated by Hypertensive disorders -Pre-eclampsia and chronic hypertension, Diabetes complicating pregnancy, including gestational diabetes (GDM), Intra-uterine growth retardation (IUGR), postdated pregnancy, liquor abnormalities, recurrent pregnancy losses (RPL), Severe anemia and Rh abnormalities, pregnancy with previous cesarean section, pregnancy with medical illness, loss or decreased fetal movements

Procedure

At first counselling of the patient is done regarding the procedure. Detailed history was taken. Thorough General, systemic and obstetrical examination was done. Patients underwent routine investigations like CBC with blood group, fasting and PP blood sugar, urine albumin, thyroid profile, HIV, HBsAg, VDRL, USG foe Fetal well-being and were screened accordingly. Patients from 37 weeks and till 42 weeks who are in labour were selected for NST.

The NST was categorized as reactive and non-reactive. Reactive In a 20-minute period, two or more fetal heart rate accelerations of at least 15 beats per minute above the baseline heart rate. Each acceleration lasts at least 15 seconds.[8,9]

RESULTS

As depicted in (Table 1). Most of patients were of 21 to30 year age group.

Table 1: Distribution of study group according to maternal age (years).

Maternal age	No. of cases	%
< 21years	11	11
21-30 years	82	82
>30 years	7	7
Range	18-35 years	

Table 2: Distribution of cases according to gravida.

Gravida	Number of patients	%
Primi gravida	48	48
Second gravida	29	29
Multi gravida	23	23

Table 3: Reassuring (Group 1) and non-reassuring (Group 2) NST in specific period of gestation.

POG in weeks	Group 1	%	Group 2	%
37-40	44	88	42	84
40-42	6	12	8	16

As depicted in Table 3 majority of our patients (86%) from both groups had POG 37 to 40 weeks and rest 14% patients had POG 40 to 42 weeks.

Table 4: Maternal outcome in patients having reassuring NST (Group 1).

Mode of delivery	No. of patients	%
NVD	40	80% (40/50)
Lscs	8	16% (8/50)
Instrumental	2	4% (2/50)

According to table number 4 In GROUP 1 majority of patients (80%) had normal vaginal delivery and 16% patients gone through LSCS and 4% patients had instrumental deliveries.

Table 5: Maternal outcome in patients having non-reassuring NST (Group 2).

Mode of delivery	No. of patients	%
NVD	6	12% (6/50)
LSCS	43	86% (43/50)
Instrumental	1	2% (2/50)

According to table number 5 In GROUP 2 majority of patients (86%) had LSCS and 12% patients hadnormal vaginal delivery while 2% had instrumental deliveries (forcep/ventouse). As depicted in Table 6 most of the babies of group 1 had APGAR score >7 in1 minute and 5 minutes while in group 2 APGAR score >7 was in 56% and 64% babies respectively in 1minute and 5 minutes. In group 2 babies APGAR score <7 was in 44% and 36% babies respectively in 1 minute and 5 minutes.

Table 6: Correlation of APGAR scores in Group 1 and Group 2 patient's babies.

Time	Group1	APGAR >7	%	APGAR <7	%	Group2	APGAR >7	%	APGAR <7	%
1 min	50	46	92%	4	8%	50	28	56%	22	44%
5 min	50	48	96%	2	4%	50	32	64%	18	36%

DISCUSSION

Our study was done on 100 cases. 50 Normal pregnancies with reassuring NST, were taken randomly as control group and 50 normal pregnancy cases with abnormal NST, were taken randomly as study group. As depicted in Table 1. Most of patients were of 21 to30 year age group. majority of our patients (86%) from both groups had POG 37 to 40 weeks and rest 14% patients had POG 40 to 42 weeks.

In control group , majority of patients (80%) had normal vaginal delivery and 16% patients gone through LSCS and 4% patients had instrumental deliveries .whereas In study GROUP majority of patients (86%) had LSCS and 12% patients had normal vaginal delivery while 2% had instrumental deliveries(forcep / ventouse). most of the babies of control group had APGAR score >7 in1 minute and 5 minutes while in study group APGAR score >7 was in 56% and 64% babies respectively in 1minute and 5 minutes. In group 2 babies APGAR score <7 was in 44% and 36% babies respectively in 1 minute and 5 minutes. Our results are comparable with other similar studies done by Schifrin et al and Phelan.

Schifrin et al found out that late decelerations during subsequent stress testing or labor, low Apgar scores, and perinatal deaths were more common in low-risk pregnancies than in high-risk pregnancies and more common in those with nonreactive NST than in those with reactive NST. Routine NST testing appears to improve the resolution of maternal risk classification and may contribute to better perinatal outcome. [5]

Phelan (1981)8 conducted a study in high-risk pregnancies using NST and found out while the reactive group experienced a favorable fetal outcome, the nonreactive

group demonstrated a significant increase in the overall caesarean section rate, the rate of caesarean sections for fetal distress, and the perinatal mortality rate. Based on their experience, the NST continues to be a valuable procedure for the assessment of fetal well-being in their high-risk pregnancies. [6]

Limitations

Many other tests are there to evaluate antepartum fetal wellbeing, since such tests are invasive hence not done in this study. Sample size could be more to make results statistically more significant.

CONCLUSION

NST is simple, cheap, non-harmful, non-invasive, easily repeated, and cost effective with low maintenance profile and needs less training. Reactive NST is reassuring and indicates fetal wellbeing, but non-reactive NST alone cannot be taken as an indicator of fetal jeopardy. Ante partum fetal monitoring has proved to be beneficial in assessing the fetal wellbeing, when employed in time the perinatal morbidity and mortality can be reduced. In the present study, we noted the following findings, Probability of adverse outcome such as low APGAR score, NICU admission increased with non-reactive NST. Hence this simple test could be a good option to use in low resource centres,to screen antenatal cases and early intervention measures for reducing perinatal morbidity.

Fetal death rate is lower in population undergoing antepartum testing as compared to general untested population. Protocols using adjunctive tests (Biophysical profile, color Doppler) helps to further improve obstetric outcomes. We are able to save the babies in cases of non-reactive non-stress tests by prompt termination of pregnancy when the baby was salvageable.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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