

Original Research Article

# A PROSPECTIVE STUDY EXAMINING THE CORRELATION BETWEEN FETAL OUTCOME AND NON-STRESS TEST IN HIGH-RISK PREGNANCIES AT TERTIARY HOSPITALS

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## ABSTRACT

**Background:** NST requires little upkeep and is affordable, reproducible, safe, and simple to operate. NST is a useful tool for investigating condition of fetus in utero in low risk as well as high risk pregnancies. Assessing the role of antenatal NST in improving perinatal outcomes in high-risk pregnancies is the aim of the study.

**Materials and Methods:** A total of 150 pregnant women were enrolled in this prospective experiment, with 75 participants in group A (high-risk pregnancy) and 75 participants in group B (low-risk pregnancy). A non-stress test was performed for a duration of 20 min, if the test results were negative or uncertain, an extra 20 min of prolonged CTG was performed. Fetal stimulation was also performed. The NST was conducted before to the onset of labor.

**Result:** Among the individuals in the high-risk group, around 60% displayed "reactive" NST tracings, while in the low-risk group, this percentage was 83%. The LSCS (Lower Segment Cesarean Section) technique was employed for childbirth in around 38% of the high-risk group and 16% of the low-risk group. Approximately 27% of individuals at high risk and 11% of participants at low risk were found to have amniotic fluid with meconium staining.

**Conclusion:** The present study demonstrates a significant disparity in Apgar scores and NICU admissions between the reactive and nonreactive NST cohorts. Hence, judicious utilization of NST will unquestionably assist in promptly detecting fetuses in jeopardy, thereby averting unnecessary delays in intervention.

**Keywords:** Fetal outcomes, non-stress test, high risk pregnancies.

## INTRODUCTION

High-risk pregnancy refers to a pregnancy that is complicated by a factor that has a detrimental impact on the health outcomes of the mother, the fetus, or both. Non-stress tests can identify potential dangers to the growing fetus, enabling prompt intervention to ensure the optimal outcome. High-risk pregnancy has the capacity to adversely affect the mother and/or the newborn during the neonatal period. Approximately

14% of pregnancies are believed to fall under this classification.<sup>[1-3]</sup>

The Non Stress Test is an uncomplicated, direct, noninvasive investigation that can be easily repeated as necessary. Gestational age has an impact on the responsiveness or acceleration of heart rate. The role of being a mother evokes a diverse array of emotions. Despite the joyous nature of the event, challenges are still present. It is precise, especially considering the overall increase of challenging and valued pregnancies in recent years. The increase in birth rates

can be attributed to the changing lifestyle patterns in the modern world, the consequences of urbanization and industrialization, and the growing prevalence of delayed pregnancies due to parents prioritizing their jobs. With the growing acceptance of the modest family norm, it is increasingly expected that every intended pregnancy leads to the successful birth of a healthy and viable children.<sup>[4,5]</sup>

Thorough monitoring is essential to assess the well-being of the fetus, especially in pregnancies with a higher risk. The non-stress test is a commonly available, affordable, and non-intrusive method for monitoring pregnancy. This is a query that can be easily replicated as necessary. The objective of this assessment on the utilization of the non-stress test in a high-risk pregnancy is to ascertain if an abnormal non-stress test can serve as a predictive indicator of an unfavorable perinatal outcome and if it can effectively detect fetal distress at an early stage, hence assisting in the process of decision-making. To enable timely detection of high-risk patients and proper treatment, the study emphasized the importance of early registration and regular antenatal check-ups for all pregnancies.<sup>[6-8]</sup>

## MATERIAL AND METHODS

A total of 150 women have registered at government general hospital, srikakulam

From Jan 2023 to December 2023. Two cohorts of 150 pregnant women were established: Group A consists of 75 pregnancies classified as high-risk, whereas Group B consists of 75 pregnancies

classified as low-risk. A pregnancy is classified as high risk when the mother and/or the unborn child have a greater likelihood of experiencing negative outcomes compared to the general population. Pregnancies with a gestational age of 37 weeks or more and no identifiable risk factors were classified as low risk. The process of data collecting commenced after obtaining informed consent from the client and receiving approval from the institutional ethical committee.

### Exclusion Criteria

Exclusion criteria for this study included women who had multiple pregnancies, prenatal or postnatal diagnoses of chromosomal or structural abnormalities in the fetus, and gestational ages below 37 weeks.

NST was performed if results were negative or uncertain extra 20 min prolonged CTG were included. Also, fetal stimulation was carried out. Intravenous Ringer Lactate solution was administered initially, and then a repeat Non-Stress Test (NST) was conducted 1-2 hours later. The NST was conducted before to the onset of labor. Analysis of the NST tracings to determine if the ACOG guidelines were adhered to during the procedure. A standard test comprises of a minimum of two accelerations that exceed the baseline heart rate by at least 15 beats for more than 15 sec. The analysis of perinatal outcome was conducted using meconium staining of the amniotic fluid. The perinatal outcomes were associated with the analysis of intrapartum CTG, which was conducted following the consensus standards of FIGO 2015.<sup>[10-13]</sup>

## RESULTS

**Table 1: Participants' socioclinical features (N=150)**

Variable	Group	
	High risk (n=75) (%)	Low risk (n=75) (%)
Age (mean±SD) (in years)	31.98±6.67	30.7±5.34
<b>Parity</b>		
Primigravida	24 (31)	19 (25)
Multigravida	51 (69)	56 (75)
<b>ANC Registration</b>		
Booked	60 (80)	65 (61)
Unbooked	15 (20)	10 (9)
Gestation age (mean±SD) (in years)	38.8±2.64	39.6±2.43
<b>NST</b>		
Reactive	38 (51)	57 (76)
Non-reactive	37 (49)	18 (18)
<b>FIGO classification</b>		
Normal	39 (59)	51 (68)
Suspicious	25 (27)	16 (22)
Pathological	11 (13)	8 (10)
<b>Mode of delivery</b>		
LSCS	34 (35)	23 (10)
Normal	41 (65)	52 (56)
MSAF	17 (23)	9 (12)
NICU admission	38 (67)	19 (25)
Birth weight (mean±SD) (in years)	3.63 ± 1.98	3.98 ± 3.09
<b>APGAR score at 1 minute</b>		
≤6	27 (36)	21 (28)
>6	48 (64)	54 (72)
<b>APGAR score at 5 minutes</b>		
≤6	22 (30)	18 (24)

>6	53 (70)	57 (76)
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**Table 2: Relationship between the APGAR score at one minute and the FIGO classification category (N=150)**

FIGO Classification	APGAR score					
	High risk group (n=75)			Low risk group (n=75)		
	≤6 (n=25)	>6 (n=50)	P value*	≤6 (n=25)	>6 (n=50)	P value*
Normal	3 (12%)	28 (56%)		1 (4%)	46 (92%)	
Suspicious	7 (28%)	13 (26%)	0.002	6 (24%)	3 (6%)	0.002
Pathological	9 (36%)	5 (10%)		4 (16%)	0 (0%)	

\*Chi-square test

**Table 3: Relationship between the APGAR score at five minutes and the FIGO classification category (N=150)**

FIGO classification	APGAR score					
	High risk group (n=75)			Low risk group (n=75)		
	≤6 (n=20)	>6 (n=55)	P value*	≤6 (n=10)	>6 (n=65)	P value*
Normal	0 (0%)	28 (37%)		1 (1%)	47 (84%)	
Suspicious	10 (50%)	11 (13%)	0.001	4 (4%)	0 (0%)	0.001
Pathological	10 (50%)	7 (10%)		5 (5%)	0 (0%)	

**Table 4: NST's ability to predict perinatal outcomes**

Parameters	Predictive value (%)				
	Overall	High risk group (n=50)		Low risk group (n=50)	
		Nst reactive	NST non-reactive	NST Reactive	NST non-reactive
Sensitivity	96.4	97.3	94.4	97.4	93.9
Specificity	84.6	85.4	84.6	92.4	85.9
PPV	42.7	55.4	47.8	65.8	53.8
NPV	99.0	97.6	94.4	97.3	96.3

## DISCUSSION

NST offers reduced maintenance requirements in addition to benefits including affordability, safety, repeatability, and user-friendliness. The possibility of adverse consequences such as amniotic fluid stained with meconium, a low APGAR score, and the need for hospitalization in the Neonatal Intensive Care Unit (NICU). An ongoing investigation revealed that the average age of the participants in both study groups was very similar. Singh et al.'s study indicated that the high-risk group's average age was 25.1 years, which is fairly similar to the age reported in the current study. Similar average ages were also found in studies by Denny et al., Hoh et al., Verma et al., Bano et al., Lohana et al., Arunkumar et al., and Sekhavat et al.<sup>[14,15]</sup>

The findings of the current analysis suggest that there were a little bit more multipara individuals in the high-risk group than in the low-risk one. The study's findings indicated that the high-risk group had a higher percentage of unbooked prenatal cases (either no antenatal appointments or fewer than three antenatal visits) than the low-risk group. According to the results of the current study, the average gestational age of those in the high-risk group was marginally lower than that of the low-risk group. Severe anemia, which accounted for 20% of cases, was the most frequently observed risk factor among the participants in this study. In close second place, affecting 18% of the subjects, was preeclampsia.<sup>[16,17]</sup> The "non-reactive NST" disparities between the high-risk and low-risk groups were found to be

statistically significant in the current investigation. Based on the FIGO Classification, the present study found that those in the high-risk group were more likely than those in the low-risk group to correctly identify the "pathological category" and the "suspicious category." The ongoing investigation indicates that the percentage of people who encountered "MSAF" in high-risk groups (24%) and low-risk groups (10%) did not differ statistically significantly. These results are in line with research by Lohana et al. and Himabindu et al. newborns in the high-risk group were born weighing an average of 2.5 kg, which was significantly less than the 2.9 kg of newborns in the low-risk group. Miller et al. also discovered that the non-reactive NST group had a higher prevalence of babies born with birth weights below the 10th percentile for gestational age.<sup>[18,19]</sup>

Furthermore, the current study found that high-risk women with non-reactive NST had a higher incidence of lower segment cesarean sections (LSCS, at 36%) compared to women who gave birth vaginally regularly (16%). Reports from Himabindu et al., Edessy et al., Raouf et al., and Kaur et al. state that the prevalence of LSCS was 39%, 42.7%, 46%, and 88%, respectively.

The overall perinatal outcome prediction rates for the NST test were 1.4%, 83.5%, 48.8%, 98.7%, 51.3%, and 94.1% for the false positive rate, false negative rate, and positive predictive value (PPV), respectively. According to Biswas et al., the NST test had a 94.1% negative predictive value (NPV), a 30.7% positive predictive value (PPV), a 72.7% specificity, and a sensitivity of 72.7%. According to

Himabindu et al., the NST test had the following values: sensitivity, specificity, PPV, NPV, and 85.3%, 83.7%, 54.6%, and 96.7%, in that order.<sup>[20-23]</sup>

## CONCLUSION

The current study reveals a notable discrepancy in Apgar scores and NICU hospitalizations between the reactive and nonreactive NST groups. Therefore, the application of NST will undoubtedly aid in swiftly identifying fetuses at risk, thus preventing unnecessary delays in intervention. The results of this study indicate that a reactive non-stress test (NST) is highly reliable in confirming a healthy pregnancy, since it has a high level of specificity and a strong negative predictive value. Therefore, it can serve as the most exemplary screening or admission test by itself. The low positive predictive value indicates that a non-reactive NST cannot be relied upon as a conclusive predictor of fetal hypoxia. Therefore, when non-stress test (NST) results are negative, it is recommended to arrange obstetric intervention after performing supplementary tests.

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