Int. J Med. Pharm. Res. (P-ISSN: 2958-3675 | E-ISSN: 2958-3683)
Available on: https://ijmpr.in/

International Journal
of Medical and Pharmaceutical Research

CASE REPORT **OPEN ACCESS**

Correlation Of Prenatal Non-Stress Test with Perinatal Outcome in High-Risk Pregnancies

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Received: 25-11-2024
Accepted: 05-01-2025
Available online: 09-01-2024

A B S T R A C T

Background: High risk factors during pregnancy adversely affect the maternal and foetal outcome increasing perinatal morbidity and mortality. Antepartum foetal surveillance can detect foetal hypoxia and acidemia before it becomes irreversible. Non- stress test (NST) is simple and cost-effective method of antepartum foetal surveillance. The objective of the study was to analyse the predictive value of NST in evaluating perinatal outcome in high-risk pregnancies.

Materials and Method: Present study was carried out on 100 high-risk pregnant women with singleton pregnancy, of more than 34 weeks period of gestation.All participants underwent prenatal non-stress testing (NST). Based on the results, the cases were categorized into two groups: reactive NST and non-reactive NST. Perinatal outcomes were then assessed and compared between the two groups.

Results: The common risk factorsobserved in our study were gestational hypertension (19%), anaemia (17%), hypothyroidism (14%), pre-eclampsia (10%), oligohydramnios (10%).Around 66% of the participants had reactive prenatal NST while 34% cases had non-reactive NST. Around 41% of the infants were low birth weight in non-reactive NST group while 13.6% in reactive group. Total 20.59% babies in non-reactive NST group had low Apgar at 5 minutes requiring NICU admission while 6.06% babies in reactive NST group had low Apgar requiring admission.

Conclusion: Present study reveals significant difference in perinatal outcomes in high-risk cases with reactive and non-reactive NST. NST can be used for identifying the foetuses at risk of asphyxia and avoiding unnecessary delay in intervention. It can be used as single best screening in low resource centres to screen high risk antenatal cases.

Keywords: High-risk pregnancy, non-stress test (NST), Apgar score, Perinatal outcome.

INTRODUCTION

A pregnancy is defined as high risk when the probability of an adverse outcome for the mother or child is increased above the baseline risk, by the presence of one or more ascertainable risk factors[1]. Evaluation of antepartum foetal condition has become essential to obstetric care in both normal and complicated pregnancies. There is increased risk of complications like foetal hypoxia, foetal distress or even intrauterine death if timely intervention is not done. According to American College of Obstetricians and Gynaecologists committee (ACOG), the aim of antepartum foetal surveillance is to detect foetal distress and prevent foetal death[2].

Prenatal non stress test popularly known as NST, is a method to test foetal well-being before the onset of labour. The presence of foetal heart rate acceleration with foetal movement is the most critical feature of non-stress test[3]. It is a non-invasive test used for the surveillance of high-risk pregnancies where the foetus is judged clinically to be at risk for hypoxemia or increased risk of death[4]. This test involves the use of doppler detected foetal heart rate acceleration coincident with foetal movements perceived by the mother. It is initiated from 32 weeks onwards till term to assess foetal well-being[5].

The NST recognizes the coupling of foetal neurological status to cardiovascular responses. It is one of the factors that tends to disappear earliest during progressive foetal compromise[6]. NST is simple, non-invasive, easily repeated and needs less training. It plays a crucial role in the monitoring of high-risk pregnancies. Currently non-stress test (NST) is widely used primary testing method for assessment of foetal well-being[7].
The present study was conducted to analyse the predictive value of NST in evaluating perinatal outcome in high-risk pregnancies.

MATERIALS AND METHOD

The present study was a prospective study conducted on 100 pregnant women in a tertiary care hospital from Jan 2021 to June 2022. High risk singleton pregnancy of gestational age ≥ 34 weeks was included in the study. Risk factors included were anaemia, pre-eclampsia, gestational hypertension, gestational diabetes mellitus, overt diabetes mellitus, oligohydramnios, intrauterine growth restriction, advanced maternal age, hypothyroidism and post-dated pregnancy. Women with gestational age < 34 weeks, multiple pregnancy, malpresentation, previous LSCS were excluded from the study.
After taking detailed history and clinical examinations, pregnant women were subjected to required investigations. Specific managements were started for the high-risk conditions present. Steroid coverage was given if required.Foetal surveillance was done with NST weekly/ biweekly/ daily depending on the severity of the risk condition.During examination, the patients were kept in left lateral or semi-recumbent position. Recordings were carried out over a period of 20 minutes at first. If non-stress test remained non-reactive or equivocal, external stimulus was given and NST was repeated. Biophysical profile (BPP) was done if required. Decision of termination of pregnancy was taken if abnormality detected in foetal surveillance.Pregnancies were followed up till delivery. Mode of delivery, indications of caesarean sections, neonatal outcome like APGAR score, birth weight, NICU admission and neonatal mortality were noted. Pregnancy outcome was compared and analysed with the prenatal NST.

Statistical Analysis

Descriptive statistical analysis was carried out utilizing Microsoft Excel. To know the association between dependent and independent variables chi-square was applied accordingly. P value less than 0.05 was considered as statistically significant.

RESULTS

The mean age of the participants with high risk factors was 26.3±4.5 years. 54% of the participants were primigravida while 46% were multigravida. Mean gestation age was 37.5 ±1.5 weeks.
Table 1 shows the distribution of different risk factors in the study participants, prenatal NSTs and mode of delivery. The common risk factors were gestational hypertension (19%), anaemia (17%), hypothyroidism (14%), pre-eclampsia (10%), oligohydramnios (10%), IUGR (8%), elderly primigravida (8%), gestational diabetes mellitus (6%), overt diabetes (4%) and postdated pregnancy (4%).
Among all the participants reactive prenatal NST tracing was observed in 66% while non-reactive NST was seen in 34% cases. Non- reactive tracings were more common in pre-eclampsia (50%), overt diabetes mellitus (50%), IUGR (37.5%), gestational hypertension (36.8%) and gestational diabetes mellitus (33.4%).

Table 1: Distribution of risk factors, prenatal NST and mode of delivery

Serial no.	Risk factors	n	%	Prenatal NST				Mode of delivery			
				Reactive		Non-Reactive		Vaginal		LSCS	
				n	%	n	%	n	%	n	%
1	Anaemia	17	17	12	70.6	5	29.4	11	64.7	6	35.3
2	Gestational hypertension	19	19	12	63.2	7	36.8	10	52.6	9	47.4
3	Pre-eclampsia	10	10	5	50	5	50	4	40	6	60
4	Intrauterine growth restriction	8	8	5	62.5	3	37.5	3	37.5	5	62.5
5	Gestational diabetes mellitus	6	6	4	66.7	2	33.3	4	66.7	2	33.3
6	Overt diabetes mellitus	4	4	2	50	2	50	1	25	3	75
7	Elderly primi gravida	8	8	6	75	2	25	5	62.5	3	37.5
8	Oligohydramnios	10	10	7	70	3	30	6	60	4	40
9	Post dated pregnancy	4	4	3	75	1	25	2	50	2	50
10	Hypothyroidism	14	14	10	71.4	4	28.6	9	64.3	5	35.7
	Total	100		66		34		55		45	

Out of 100 participants, 55 had vaginal delivery while 45 delivered by caesarean section. Non-reactive NST and foetal distress was the most common indication for caesarean section. Other indications were non progress of labour, cephalopelvic disproportion (table 2).

Table 2: Indications of caesarean sections

Indications	**Number**	**Percentage**
Non-reactive NST,foetal distress	35	77.7
Non progress of labour	4	8.8
Cephalopelvic disproportion	6	13.3

Table 3 compares the perinatal outcomes in high-risk cases with reactive and non-reactive NST. Occurrence of low birth weight was more in cases with non-reactive NST (41.1%) in comparison to reactive NST (13.6%) which is statistically significant (p-value < 0.05). Incidence of meconium-stained liquor was same in both the groups.

Table 3: comparison of perinatal outcome in reactive NST and non-reactive group

	Reactive NST		Non - reactive NST		Statistical Significance	
	N=66		N = 34			
	n	%	n	%	P-Value	
Birth weight >2.5kg	57	86.36	20	58.82	0.002	p < 0.05
Birth weight <2.5kg	9	13.64	14	41.18		
Meconium-stained liquor	8	12.12	5	14.71	0.716	p > 0.05
Apgar score at 5 min						
<6	4	6.06	7	20.59	0.028	p < 0.05
>6	62	93.94	27	79.41		
NICU Admissions:	10	15.15	16	47.06	0.0006	p < 0.05
LBW	2	3.03	4	11.76	0.081	p > 0.05
Asphyxia	3	4.55	7	20.59	0.011	p < 0.05
Hypoglycaemia	1	1.52	2	5.88	0.225	p > 0.05
Neonatal jaundice	4	6.06	2	5.88	0.972	p > 0.05
Mortality	0	0.00	1	2.94	0.161	p > 0.05

Total 7 babies (20.59%) of patients with non- reactive NST had Apgar score <6 at 5 minutes in comparison to 4 (6.06%) babies of reactive NST group (p-value <0.05). Total NICU admissions due to asphyxia was significantly high in patients with non-reactive NST, while there was statistically no significant difference in admissions due to LBW, hypoglycaemia and neonatal jaundice.

DISCUSSION

The main purpose of the various antepartum surveillance techniques is to detect foetal distress in order to prevent foetal death. Reactive non-stress test predicts the foetal wellbeing for the next few hours in labour [8]. This test is most commonly used for antepartum evaluation of the foetal status. It is non-invasive, easily performed and interpreted, and readily accepted by patients. The present study was conducted to correlate the prenatal NST with perinatal outcome in high-risk pregnancies thus analysing the predictive value of NST in evaluating perinatal outcome in high-risk pregnancies.

In our study mean age of the participants was 26.3 years which was similar to Singh et al who noted mean age of 25.1 years[9]. Out of 100 participants, 54 were primigravidae while 46 were multigravidas.

In our study, the most common risk factors identified were gestational hypertension (19%) and anaemia (17%), followed by hypothyroidism (14%), pre-eclampsia (10%), oligohydramnios (10%), intrauterine growth restriction (IUGR) (8%), elderly primigravida (8%), gestational diabetes mellitus (6%), overt diabetes (4%), and postdated pregnancy (4%). A similar study conducted by Garg S et al. in 2016 reported gestational diabetes mellitus (43.1%) as the most prevalent risk factor, followed by gestational hypertension (9.8%) and IUGR (3.9%) [10].

The present study found that 34% of high-risk cases had non-reactive NST tracings, more frequently in pre-eclampsia (50%), overt diabetes mellitus (50%), IUGR (37.5%), gestational hypertension (36.8%) and gestational diabetes mellitus

(33.4%) cases. A similar conducted by Jamatia A et al. found that 32% incidence of non-reactive NST in preeclampsia patients [11]. These findings also correlate with the study done by Himabindu et al[12].

In our study number of low-birth-weight babies was significantly high in cases with non-reactive NST (41.1%) in comparison to reactive NST (13.6%) while incidence of meconium-stained liquor was same in both the groups. Study done by Kaur et al also showed that mean birth weight of babies was significantly less in non-reactive NST group than in reactive NST group in32 to 37weeks of gestation[13].

In our study significant number(20.59%) of infants in non- reactive NSTgroup had Apgar score <6 at 5 minutes in comparison to 6.06% babies of reactive NST. In a similar study conducted by Bano et al, 42.8% neonates had Apgar score<7 at 5 minutes in non-reactive NST group, while no neonate had low Apgar in reactive NST group[14].

In our study significantly high number of babies (47.06%)in non-reactive NST group required NICU admission than reactive NST group (15.15%). In non-reactive NST group significant number of admissions were due to asphyxia (20.59%) while admissions due to low birth weight, hypoglycaemia, and neonatal jaundice were similar in both the groups. It is comparable to the study done by Amin H et al, which showed 60% NICU admission in high-riskcases [15]. Panda et al. in their study found 24.12% NICU admission in non-reactive NST group and 9.30% NICU admission in reactive NST group [16].

CONCLUSION

Perinatal outcome gets adversely affected in high-risk pregnancies and requires appropriate method for antepartum surveillance to detect intrauterine hypoxia. NST helps in the identification of the foetus at risk of asphyxia and avoids unnecessary delay in intervention and thus improves perinatal outcome. NST is simple, cheap, non-invasive, easily repeated, and cost-effective test with low maintenance. It can be used as single best screening or admission test in low resource centres to screen high risk antenatal cases.

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