

Effectiveness of selected Maternal Positions Onbiophysiological Parameters of Antenatal Mothers and Fetus During Non Stress Test

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ABSTRACT

Non-Stress test is a non-invasive test performed over 28 week of gestation for detection of ante partum fetal surveillance. Maternal positioning can have an impact on both the mother's and fetal physiological well-being. Objective: Assess and compare the effectiveness of maternal positions on bio physiological parameters of the fetus during NST. Methods: Quantitative quasi-experimental pretest, posttest only research design, 60 mothers were selected by random sampling technique. Maternal, fetal bio physiological parameters tool was used. The mothers were placed in left lateral, supine position while performing NST and fetal parameters were monitored and interpreted. Mother vitals also monitored. Results: The post test score of fetal reaction in supine was 4.20 ± 1.16 and in lateral 4.90 ± 0.31 . The calculated independents' test value of $t = 3.205$ was found to be statistically significant at $p < 0.01$ level. Conclusion: This reveals that the left lateral position is highly effective position for the mother while performing NST.

Keywords

Non stress test, antenatal, positions, fetal parameters, random sampling

Imprint

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INTRODUCTION

Pregnancy is considered as normal biological event, 6-33% of pregnant women experience pregnancy complications related to the mother and fetus, or both. In India about 35% of antenatal mothers belong to high risk category, which leads to 70% of perinatal mortality and morbidity [1]. It has positive effect on fetal health, by reducing low birth weight and perinatal mortality rates through antenatal fetal surveillance. Pregnant women should receive appropriate Antenatal Care (ANC) to promote maternal, fetal health. According to **World Health Organization (WHO) (2021)**, Antenatal care is essential for protecting the health of women and their unborn fetus. Health care professionals should ensure the better health status for the mothers and their fetus, and also to detect any abnormality [2].

During ante partum period, several tests were performed routinely to monitor fetal well-being in that the most commonly recognized screening measure of fetal well-being is the measurement of the fetal heart rate rhythm with electronic fetal monitoring [3]. Non-stress test is frequently used as a first choice for fetal health and survival assessment. According to **American pregnancy Association (2021)** Non-Stress test is a simple, non-invasive, inexpensive test performed in pregnancies over 28 weeks gestation for ante partum fetal surveillance. It is easy to perform and causes no inconvenience or complications to the mother.

According to **Obstetrics of the American College of Obstetricians and Gynaecologists (ACOG) (2021)** A device called a transducer is rolled over gently on the abdomen which produces echoes are transformed into photographs displayed on a computer screen [4]. The test, is also known as a cardiotocography, captures the fetal movement, heartbeat, and contractions. It detects changes in heart rhythm when the fetus moves from rest to movement, as well as during contractions or labour. Fetal hypoxia can be detected early which will reduce the fetal mortality and good fetal-maternal outcomes. The NST can reassure that the fetus is healthy and developing normally. The test is typically termed "reactive", "uncertain reactive" and "nonreactive". **Reactive (normal):** -At least 2 fetal movements with 20 min; acceleration 15 beats/min; variability

10 beats/min and a baseline rate FHR within normal range. **Non-reactive:** - fetal movement absent, poor or no acceleration; no variability and FHR within or outside the normal range. **Uncertain reactivity:** -2 fetal movements within 20 minutes; acceleration <15 beats/min; variability <10 beats/min [5].

Trained and registered midwives, nurses, and physicians should read and interpret the test results according to their criteria and guidelines. The non-stress test can be done 26 to 28 weeks of gestation. The NST is reactive from 32 weeks onwards [6]. The improved oxygenation and gaseous exchange in the mother increases the uterine and placental perfusion, preventing the fetal compromise [7]. As nurses play a vital role while doing non-stress test. Furthermore, a randomized controlled study by Essar reported that the result of non-stress test reactive in left sidelong position than those put in recumbent and semi fowlers positions [8].

LITERATURE REVIEW

Moreover, cito et al., and Essa et al., evaluated NST results on different maternal positions the result stated that the left lateral position during CTG had good results [9]. These findings were reported by Ibrahim in Saudi Arabia [10], Arogiamarie in India [11], and Kiratli in Turkey [12] among other countries.

MATERIALS AND METHODS

Quantitative approach with Quasi-experimental pretest, posttest only research design. Investigator allocates participants to experimental group I and II on simple random technique. A total of 60 antenatal mothers who attended antenatal clinic (n=60) were recruited as study participant's. The inclusive criteria include age from 21-35 years, Primi and multi mothers with 28-37 weeks of gestation, relaxed and non-irritant uterus, who were willing to participant. The excluded criteria were multiple pregnancies, taking antiepileptic and barbiturates, mother who were mentally ill, diagnosed with Intra uterine death, cord prolapse, abruption placenta. After recruiting the study participants, investigator invited each selected participant to assigned private room for data collection a self-structured questionnaire was provided to obtain obstetrical and demographic information and followed by it maternal, fetal bio physiological parameter tool was used while performing the non-stress test. Bio physiological parameters of the mothers was monitored before and after the test, followed by that fetal bi ophysiological parameter including (baseline

FHR, baseline variability, number of Fetal movement, acceleration, deceleration) was assessed with NST machine and was recorded as a graph on the paper strip for the duration of 20 minutes Once the entire intervention is completed, the mother was made comfortable. Finally, the monitored NST interpretation was documented by the investigator for each sample

Ethical statement

Ethical approval in this study was obtained from Institutional Ethical Committee (IEC) of Saveetha Institute of medical and Technical Sciences (SIMATS), Tamilnadu, India and with approval number of 054/04/2021/IRB-HS/SIMATS. The investigator maintained good rapport and elaborately explain in detail about the importance, purposes and benefits of the study by providing with patient information sheet in their own regional language and after clarifying the doubts a written informed consent was obtained from each sample. The ethical principles was followed and adhered to protect the rights of the samples, the safety and aseptic precautions was taken into consideration till the completion of the intervention and confidentiality was maintained throughout the study.

RESULTS AND DISCUSSION

The current study, titled "effectiveness of selected maternal positions on bio physiological parameters of antenatal mothers and fetus during non-stress test" included 60 antenatal mothers. The posttest mean score of fetal reaction among mothers in supine position was 4.20 ± 1.16 and the posttest mean score of fetal reaction among mothers in lateral position was 4.90 ± 0.31 . The calculated independents' test value of $t = 3.205$ was found to be statistically significant at $p < 0.01$ level. This reveals that the left lateral position is highly effective position for the mother while performing non stress test and also obtain exact results which helps to rule out health of the fetus.

Non stress test is a diagnostic procedure which is well practiced by nurse practitioners and midwives; Nurse midwives can play a vital role in assisting the antenatal mothers during non-stress test by providing various positions like supine, sitting, semi fowler's, left lateral and standing position [13].

Our study aimed to compare and assess the effectiveness of maternal positions on biophysiological parameters of the fetus during non-stress test. The findings revealed that the physiological parameters of

the antenatal mother was highly significant in the left lateral position ($P=0.559$) rather than in supine position ($P=0.723$). All vital parameters were normal like pulse rate, systolic and diastolic blood pressure before and after the non-stress test but in the respiratory rate ($p<0.005$) it was slight variation in supine position.

The present study finding is supported by **Nisha (2014)** who conducted a study to assess the effect of maternal positions on physical and physiological parameters of antenatal mothers and fetus during non-Stress Test in selected hospital at Kerala, India [14]. The study results determined that that there was slight variation in diastolic pressure, respiration before and during non-stress test in three positions. Another similar study was conducted by **Maneesha M.S (2012)** who determined maternal fetal physiological parameters in sitting and left lateral position during non - stress test, Karnataka [15]. The result showed that there were slight changes in maternal bio-physiological parameters like maternal systolic ($p=0.001$), diastolic ($p=0.001$) blood pressure and pulse rate ($p=0.001$) between left lateral and sitting position.

Regarding non stress test results in this study revealed that in the supine position, 17(56.7%) were reactive, 9(30%) were uncertain reactive and 4(13.3%) were non-reactive whereas in the lateral position, 27(90%) were reactive and 3(10%) were uncertain reactive and non-reactive was nil. This reveals that in the left lateral position the fetal biophysiological parameters were normal and reactive when compared to that of supine position. In left lateral position the mother's comfort is more and there is a good acceleration shown in the graphical record that is shown in table 1.

Table 1

Frequency, percentage distribution of bio physiological parameter of antenatal mothers in supine and lateral position before and after non stress test. N=60

FETAL ASSESSMENT	SUPINE POSITION		LEFT LATERAL POSITION	
	NO.	%	NO.	%
Reactive (Normal) (5)	17	56.7	27	90.0
Uncertain reactive (3 – 4)	9	30.0	3	10.0
Non-reactive (1 – 2)	4	13.3	0	0

This finding was also supported by (**Lekshmi S et al.,**) who determined the effects of different Maternal Positions on maternal parameters and fetal heart rate among antenatal mothers during NST, Pondicherry, India. The study was an experimental research design with 60 samples of antenatal mother who were

admitted in antenatal clinic. The result showed that in left lateral position 26(87%) antenatal mothers had reactive non stress test and four (13%) had non-reactive non-stress test. In semi fowlers position all 30 (100%) antenatal mothers had reactive non stress test.

The present findings was also supported by **Aro-giamarie Gorler et al., (2021)** conducted the study on “correlation of maternal position on maternal and fetal parameters during Non-stress among antenatal mothers at Venkateshwara Medical College Hospital & Research Center, Pondicherry, India”. A descriptive correlation study was conducted with 60 antenatal mothers of 32-37 weeks of gestation were selected through convenience sampling technique. The results showed that the overall r value was 0.28 and there is a positive correlation in left-lateral position between the maternal and fetal parameters during test when compared to other positions.

Section A: Sample characteristics.

Among 60 study participants, 30 were in experimental group I (supine position) with regards to the age 21(70%) were between the age group of 21-25 years, educational qualification 19(63.3%) belongs to primary and high school education, occupation 18(60%) were housewives, nuclear family 17(56.7%), 10(33.3%) had monthly income of Rs. 20,000 and above, religion 20(66.6%) belongs to hindu, 27(90%) had booked their pregnancy. With regards to gravida 21(70%) belongs to primi gravida, gestational age 17(56.7%) belongs to 28-32 weeks of gestation. With regards to BMI, 11(36.7%) had 25-29.9 (over weight) were obese.

In experimental group II (left lateral position) most of antenatal mothers, 13(43.4%) were aged between 21 – 35 years, 17(56.7%) had primary and high school education, 21(70%) were housewife, 21(70%) belonged to nuclear family, 10(33.3%) had monthly family income of Rs.15,000 – 20,000, 19(63.3%) were Hindus, 30(100%) had booked for pregnancy, 17(56.7%) were multi gravida, 12(40%) had a gestational age of 37-40 weeks and 13(43.4%) had BMI of 25-29.9(over weight).

Section B: Frequency and percentage distribution of bio physiological parameter of antenatal mothers in supine, lateral position pretest and posttest during non-stress test.

Antenatal mothers physiological parameters was highly significant in the left lateral position ($P=0.559$) rather than in supine position ($P=0.723$). All vital parameters were normal like pulse rate, diastolic and

systolic blood pressure before and after the non-stress test but in the respiratory rate ($p < 0.005$) it was slight variation in supine position.

Section C: Effectiveness maternal positions (left lateral, supine) on biophysiological parameters during non-stress test among antenatal mother.

Table 1 and Figure 1 shows that the NST shows in the supine position, 17(56.7%) were reactive, 9(30%) were uncertain reactive and 4(13.3%) were non-reactive whereas in the lateral position, 27(90%) were reactive and 3(10%) were uncertain reactive and non-reactive was nil. This reveals that in the left side position the fetal biophysiological parameters was normal and reactive when compared to that of supine position. In left lateral position there was a more acceleration which was shown in the graphical record.

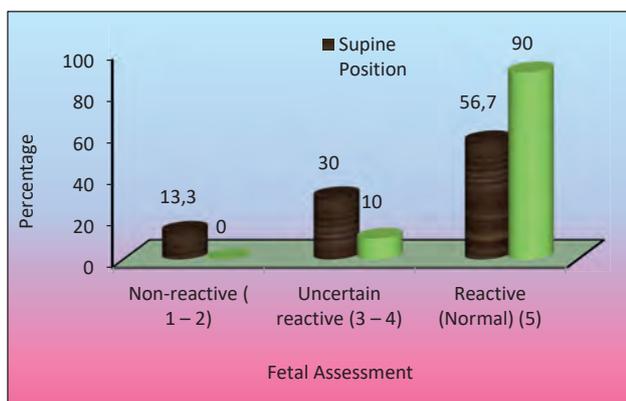


Figure 1. Percentage distribution of fetal assessment in supine and left lateral position after non stress test

Table 2

Comparison the biophysiological parameters of fetus in supine and lateral position among antenatal mothers. N=60

BIOPHYSIOLOGICAL PARAMETERS OF FETUS	RANGE	SUPINE POSITION		LEFT LATERAL POSITION	
		NO.	%	NO.	%
Baseline FHR	110-160 beats/min	18	60.0	27	90.0
	160 - 180 beats/min	8	26.7	3	10.0
	180 & above beats/min	4	13.3	0	0
FHR Variability	5 - 15 beats/min	17	56.67	27	90.0
	6 - 18 beats/min	9	30.0	3	10.0
	7 - 10 beats/min	4	13.3	0	0
Fetal Movement	2 within 20 min	20	66.7	27	90.0
	1 within 20 min	7	23.3	3	10.0
	0	3	10.0	0	0
Acceleration	2 within 20 min	20	66.7	25	83.33
	1 within 20 min	7	23.3	3	10.0
	0	3	10.0	2	6.67
Deceleration	0	20	66.7	25	83.33
	1 within 20 min	6	20.0	3	10.0
	2 within 20 min	4	13.3	2	6.67

Section D: Comparison the biophysiological parameters of fetus in supine and lateral position among antenatal mothers.

Table 2 shows that in the left lateral position Fetal baseline FHR 110-160(90%), FHR variability 5-15 beats/min (90%), fetal movements more than 2 movements (90%), acceleration more than 2 (83.33%), no deceleration(83.33). The calculated independent's test value of $t = 3.205$ was found to be statistically significant at $p < 0.01$ level. This reveals that the left lateral position is highly effective position for the mother while doing NST.

Section E: Association of posttest physiological parameters with their selected demographic variables of antenatal mothers in the supine position.

In the present study age and family income had shown statistically significant association in supine position at $p < 0.05$ level and also body mass index had shown statistically significant association in lateral position at $p < 0.05$ level.

CONCLUSION

Non stress test is a simple and non-invasive procedure which assesses fetal responsiveness in womb. The test is named as "non-stress" because no stress is placed on the fetus during the test. It is performed during 28-32 weeks of gestation. Position plays a main role to obtain exact result so, the left lateral position it is easy and comfortable position for the mother and

fetus will be more reactive when compared with other positions. The post test score of fetal reaction in supine position was 4.20 and in lateral position 4.90. The calculated independent's test value of $t=3.205$ was found to be statistically significant at $p>0.01$ level. From this study, it was concluded that in the left lateral position mother and fetal bio physiological parameters were more effective and it is recommended for the nurse practitioner and midwife while carrying our non-stress test. The ladies in the left lateral position saw more foetal movements than those in the semi-fowler and supine postures.

Statement on ethical issues

Research involving people and/or animals is in full compliance with current national and international ethical standards.

Conflict of interest

None declared.

Author contributions

The authors read the ICMJE criteria for authorship and approved the final manuscript.

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