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Materno foetal physiological parameters in sitting and left lateral position during non - stress test (NST) monitoring in pregnancy: a cross over study

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Abstract

Introduction: The main goal of foetal observation is a healthy new born with a mother who is healthy. The non-stress test (NST) is a primary foetal surveillance tool. This study aimed to compare the maternal physiological parameters of antenatal women during NST monitoring between sitting and left lateral position and also to determine the foetal physiological parameters during NST monitoring in sitting position and left lateral position. **Methods:** The study was cross over design. The antenatal women between 34 to 40 weeks of gestation were randomly given the position as Group-A or Group-B position strategy. The setting of the study was labour ward of a selected Hospital in Udupi District, Karnataka. The total number of antenatal women included in the study were 44. **Results:** There were significant changes in maternal 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. There was significant difference in foetal physiological parameters like baseline foetal heart rate (p = 0.034) and deceleration (p=<0.001) between sitting and lateral positions. **Conclusion:** The sitting position adopted for NST by the antenatal women during their third trimester demonstrated a favourable materno-foetal physiological parameter than in lateral position. So sitting position can be encouraged as an alternative position that can be used for NST test, based on the preference of the antenatal women.

Key words: NST, physiological, parameter, maternal, foetal, non-stress test, position.

INTRODUCTION

Non Stress Test (NST) is one of the significant diagnostic tests during antenatal period. NST still continues to be a valuable procedure for the assessment of foetal wellbeing in high risk pregnancies. A study was done to evaluate role of NST as a screening method to assess perinatal outcome among 326 women. This showed that perinatal morbidity in reactive, equivocal and non reactive groups was 4.8 per cent, 28.94 per cent and 55.92 per cent respectively (Verma & Shrimali, 2012).

A study conducted among 150 mothers to evaluate the relationship between maternal positions (sitting/ left lateral) and NST results reported that either of the position could be used while performing NST (Bashtian, Khameneh & Kooshava, 2006).

Another study that was done to determine the best position for NST concluded that there existed relation between maternal position and NST results (p<0.05) and more NST reactive results were in semi fowlers position (42.8%) than left lateral position (37.6%) (Lorzade & Kazemirad, 2011).

A study was conducted to determine the effects of different maternal positions on the NST results and the preferences of mothers for different positions. The findings showed that there was significant difference among all four groups (p<0.05) and concluded that in supine position there is the lowest non-reactivity with physical discomfort (Aluş, Okumuş & Mete 2007).

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Objectives

a. To compare the maternal physiological parameters such as pulse rate, blood pressure and respiration rate of antenatal women during NST monitoring between sitting and left lateral position.

b. To determine the foetal physiological parameters such as acceleration, deceleration, baseline foetal heart rate and variability during NST monitoring in sitting position and left lateral position.

MATERIALS AND METHODS

Participants: Population of the study were antenatal women of gestational age 34-40 weeks had NST monitoring during the antenatal check-up. Both primigravida and multigravida women were included for the study. A total of 44 women between 34 to 40 weeks of gestation attending antenatal clinic for regular check-up in Dr T M A Pai Hospital, Udupi were included in the study.

Study design: The study was cross over design. The antenatal women between 34 - 40 weeks of gestation were randomly given the position as Group-A or Group-B position strategy. In Group-A position strategy, left lateral position is given first followed by sitting position; whereas in Group-B strategy, sitting position is given first followed by left lateral position. The decision for allocation of position strategy such as Group-A or Group-B for first subject was allocated randomly by using chit method and other subjects were then alternately assigned position strategy A or B. The tools used for data collection were demographic proforma, materno-foetal physical and physiological parameter monitoring chart and maternal comfort rating scale.

RESULTS

Description of sample characteristics:

Twenty antenatal women (45.5%) were between 25 to 30 years of age and, 29 (65.9%) did not have any previous experience on NST test. Twenty three (52.27%) of the NST were done between 9 am and 12 noon. Eighteen antenatal women (40.9%) had secondary level of education and, 39 (88.6%) were housewives. Thirty four (77.3%) had food intake less than two hours before the test and, 42 (95.5%) did not have any previous history of illness, 35 (79.5%) did not develop any disease during the present pregnancy. Twenty seven (61.4%) had the Body Mass Index between 8-25, and period of gestation, 21 (47.7%) between 36-38 weeks, 44 (100%) had cephalic presentation. Twenty six (59.1) foetal positions were Left Occipito Anterior and 18 (40.9%) had the fundal height between 30-35cm.

Comparison of the maternal physiological parameters between sitting and left lateral position:

Data presented in Table 1 shows the mean values of maternal physiological parameters. It reveals a significant difference between sitting position and lateral position. Systolic BP was 117.82±11.99, 112.95±9.810, 113.36±9.58 at 0 min, 7 min, 14 min in sitting position respectively, whereas in lateral position it was 104.48±12.03, 103.32± 10.16 and 106.64±12.27 at 0 min, 7 min and 14 min respectively. Diastolic BP was 71.98±9.330, 69.50±7.861, 69.86±8.930 at 0 min, 7 min, and 14 min respectively in sitting position, whereas in lateral position it was 58.41±8.552, 57.14±7.700, 60.00±11.749 at 0 min, 7 min and 14 min respectively. Pulse rate in sitting position

Table 1: Mean scores for maternal physiological parameters in sitting and left lateral position (n=44)

Physiological parameters	Sitting position			Lateral position		
	0 min Mean ± SD	7 min Mean ±SD	14 min Mean ±SD	0 min Mean ± SD	7 min Mean ±SD	14 min Mean ±SD
Systolic BP	117.82± 11.99	112.95± 9.810	113.36± 9.58	104.48± 12.03	103.32± 10.16	106.64± 12.27
Diastolic BP	71.98± 9.330	69.50± 7.861	69.86± 8.930	58.41± 8.552	57.14± 7.700	60.00± 11.749
Pulse	92.73± 12.294	95.45± 11.882	95.18± 11.53	87.70± 11.595	87.80± 11.130	88.43± 11.462
Respiration	22.05± 2.778	21.73± 2.815	22.05± 2.877	22.09± 3.476	22.23± 2.836	21.91± 2.860

was 92.73±12.294, 95.45±11.882, 95.18±11.53 at 0 min, 7 min and 14 min respectively while in lateral position it was 87.70±11.595, 87.80±11.130, 88.43±11.462 at 0 min, 7 min and 14 min respectively. Respiration rate was 22.05±2.778, 21.73±2.815, 22.05±2.877 at 0 min, 7 min and 14 min respectively in sitting position and in lateral position it was 22.09±3.476, 22.23±2.836 and 21.91±2.860 at 0 min, 7 min and 14 min respectively. Thus, there was significant reduction in maternal physiological parameters like systolic and diastolic BP, pulse rate and respiration in lateral position in comparison to sitting position.

Table 2: Repeated measures ANOVA for maternal physiological parameters in sitting position and lateral position (n=44)

Physiological parameter		df	F value	p-value
Systolic BP	Greenhouse-Geisser	3.535	30.233	0.001*
Diastolic BP		3.054	45.325	0.001*
Pulse		4.080	19.052	0.001*
Respiration		4.389	0.619	0.665

The data presented in Table 2 shows that there was significant change in maternal physiological parameters like maternal systolic blood pressure ($p < 0.01$), diastolic blood pressure, ($p < 0.01$), and pulse rate ($p<0.01$) between left lateral and sitting position. Overall there was a statistically significant difference in the physiological parameters like maternal blood pressure and pulse rate in both sitting and lateral positions during NST monitoring.

Description of the foetal physiological parameters in sitting and left lateral position

The data presented in Table 3 shows statistically significant difference in baseline foetal heart rate ($p=0.034$*) between sitting and lateral positions. The baseline foetal heart rate was 138 bpm in sitting position and 136 bpm in lateral position.

DISCUSSION

The present study revealed that the mean difference obtained for maternal physiological parameters such as systolic blood pressure was 47.96 mmHg, 9.63 mmHg and 6.72 mmHg; diastolic blood pressure was 13.57 mmHg, 12.36 mmHg and 9.86 mmHg; respiration rate was -0.04 breaths/min, 0.5 breaths/min and 0.14 breaths/min and pulse rate was 5.03 bpm, 7.65 bpm and 6.75 bpm at 0 min, 7 min and 14 min time interval between sitting and left lateral positions**.** The findings of present study support the study conducted by Tamas *et al*., 2007 where the parameters of non-stress test were correlated to haemodynamic indices and found that maternal haemodynamics alter foetal heart rate patterns in connection with different maternal positions. In the present study, the maternal physiological parameters such as systolic blood pressure, diastolic blood pressure and pulse rate in sitting position were more favourable and within normal range than in lateral position.

Study conducted in 2005 by Cito *et al*., among 1055 antenatal women to determinate influence of maternal position during the non-stress test (NST) on foetal heart rate patterns revealed that the number of foetal movements perceived by the mother was greater in the reclining position than in sitting position or while walking. The NST duration did not vary greatly in the reclining position. The present study also showed a significant difference in foetal physiological parameters such as baseline foetal heart rate and deceleration in sitting position than lateral position ($p=0.034$).

Table 3: Median, interquartile range, Z value and p- value of foetal physiological parameters in sitting position and lateral position (n=44)

Foetal physiological parameters	Sitting position		Lateral position		Z value	p value
	Median	IQR	Median	IQR		
Baseline foetal heart rate	138.00	136-138	136.00	130-146	2.123	0.034*
Total number of acceleration	5.50	3-7	4.50	3-7	0.299	0.765
Time taken for first acceleration in minutes	02:45	1:30- 5:22	02:00	1:30-4:45	0.733	0.464
Time taken for first foetal movement in minutes	02:00	1:0-4:0	03:00	1:0-4:0	0.473	0.636
Number of foetal movements	5.50	3.0-9.75	5.00	3.25-9.00	0.661	0.509
Time taken to tell the test is reactive in minutes	07:15	5:0-11:0	08:00	5:0-11:45	0.350	0.727
Beat to beat variability	1.00	1.0-1.0	1.00	1-1	0.001	1.000

CONCLUSION

The findings show that the maternal physiological parameters such as systolic blood pressure, diastolic blood pressure and pulse rate were favourable in sitting position and within normal range than in lateral position. Thus it can be concluded that the sitting position adopted for NST test by the antenatal women during their third trimester demonstrates favourable materno-foetal physiological parameters than the left lateral position. So sitting position can be encouraged as an alternative position that can be used for NST based on the preference of the antenatal women.

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