

**EFFECTIVENESS OF SELECTED MATERNAL POSITIONS UPON NON
STRESS TEST PARAMETERS AMONG ANTENATAL WOMEN**

BY

NISHA THOMAS

**A DISSERTATION SUBMITTED TO THE TAMILNADU DR.M.G.R.MEDICAL
UNIVERSITY, CHENNAI, IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE IN NURSING**

APRIL 2013

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STRESS TEST PARAMETERS AMONG ANTENATAL WOMEN**

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DECLARATION

I hereby declare that the present dissertation entitled “**Effectiveness of selected maternal positions upon non stress test parameters among antenatal women**” is the outcome of the original research work undertaken and carried out by me under the guidance of **Dr.Latha Venkatesan**, M.Sc.,(N)., M.Phil.,(N)., Ph.D.,(N), Principal and Professor in Obstetrics and Gynecology Nursing and **Mrs. Lizy Sonia. A.**, M.Sc., (N)., Ph.D.,(N)., Vice Principal and Professor, Head of the department in Medical Surgical Nursing, Apollo College of Nursing, Chennai. I also declare that the material of this has not found in any way, the basis for the award of any degree or diploma in this university or any other university.

II Year M.Sc (N)

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SYNOPSIS

A Pre Experimental Study to Assess the Effect of Selected Maternal Positions upon Non Stress Test Parameters among Antenatal Women at Selected Hospital, Chennai.

The Objectives of the Study were

1. To determine the effectiveness of positions upon the non stress test parameters among antenatal women.
2. To compare the effectiveness of various positions upon the non stress test parameters among antenatal women.
3. To find out the association between the selected demographic variables and non stress test parameters in various positions among antenatal women.
4. To find out the association between the selected obstetrical variables and non stress test parameters in various positions among antenatal women.
5. To assess the level of satisfaction of the nurses regarding effect of positions upon the non stress test parameters among antenatal women.

The conceptual framework for the study was developed on the basis of “King’s Goal Attainment Model”(1981) which was modified for the present study. The variables of the study were non stress test parameters and selected maternal positions. Null hypothesis were formulated. The level of significance selected was $P < 0.05$. An extensive review of literature was made based on the opinion of experts. A pre experimental study of time series design was used. The study included 60 antenatal women who were selected by non probability purposive sampling technique. The study was conducted at St. Antony’s Hospital, Chennai.

Demographic variable proforma, Obstetric variable proforma, Observational checklist and Rating scale on level of satisfaction of nurses regarding positions on non stress test parameters were the various tools used by the researcher.

After making the antenatal women comfortable the experiment started with the antenatal women in supine position for 20 minutes followed by left lateral position for 20 minutes followed by semi fowlers position for 20 minutes. During each position non stress test parameters (fetal heart rate, fetal movement and fetal reactivity) was recorded at 5 and 15 minutes interval when the antenatal women came to outpatient department. Finally the effectiveness of each positions upon non stress test parameters was computed.

Then the level of satisfaction of nurses regarding positions on non stress test parameters was assessed among the experimental group of antenatal women. The data obtained were analyzed using Descriptive and inferential statistics.

The Major Findings of the Study

- All of them (100%) were housewives, vegetarian, worked in indoor area as moderate workers with no any bad personal habits. Majority of them were Hindus (81.7%), most of them resided in semiurban area (63.3%) and had nuclear family (60%). Significant percentages of the antenatal women were between the age group of 21 - 25 years (45%), were graduates and above (41.7%) with a family income per month between 5001-10,001 rupees (41.6%).

- All of them (100%) had regular antenatal check up, majority of them were primipara(73.3%), anemic (85%), with no any previous obstetrical history(75%), most of them had weight between 61-80 kg(66.6%) were primigravida(68.3%) and significant percentage of the antenatal women were in a height of 141 – 160 cm (56.7%) with a gestational age above 37 weeks (41.7%).
- The mean and standard deviation of antenatal women assessed at 5 minutes the mean fetal heart rate was (M = 134.5 , SD = 12.5) and at 15 minutes (M = 133.9, SD = 11.8), the mean fetal heart rate of them was between 134.5 to 133.9 beats/minute in supine position, similarly in left lateral position mean fetal heart rate at 5 minutes was (M = 143.06 ,SD = 8.53) and at 15 minutes was (M = 143.2 , SD = 8.37), so the mean fetal heart rate in left lateral position was between 143.06 to 143.2 beats /minute. In semi fowlers position the mean fetal heart rate at 5 minutes was (M = 143.2 , SD = 9.12) and at 15 minutes was (M = 142.6 ,SD = 8.96), so the mean fetal heart rate was between 143.2 to 142.6 beats / minute in semi fowlers position. It shows that antenatal women in left lateral position had highest mean fetal heart rate than in other positions respectively. Hence the null hypothesis H_{01} was rejected.
- Mean and standard deviation of antenatal women assessed at 5 and 15 minutes was (M = 1.08 , SD = 1.09) and (M = 1.91 , SD = 1.95) in supine position , (M = 2.11, SD = 2.29) and (M = 3.11 ,SD = 3.62) in left lateral position and (M = 2.13, SD = 2.12) , (M = 2.96, SD = 3.07) in semi fowlers position respectively. It reveals that antenatal women in left lateral position had highest mean fetal movement than in other positions. Hence the null hypothesis H_{01} was rejected.

- Mean and standard deviation fetal reactivity among antenatal women assessed at 5 and 15 minutes was (M = 1.23 , SD = 0.74) and (M = 1.73 , SD = 1.05) in supine position, (M = 1.6 ,SD = 1.05) and (M = 2.51 ,SD = 1.30) in left lateral position and (M = 1.35, SD = 0.81), (M = 2.55, SD = 1.41) in semi fowlers position respectively. It proves that antenatal women in left lateral position had highest mean fetal reactivity. Hence the null hypothesis H₀₁ was rejected.
- There was a significant association between family income per month in rupees of antenatal women ($\chi^2 = 5.24$, df = 1) and fetal heart rate in supine position and no significant association between other demographic and obstetrical variables at the level of confidence P < 0.05, hence hypothesis H₀₂ and H₀₃ was rejected with regard to family income. .
- There was a significant association between complication during antenatal period of antenatal women ($\chi^2 = 4.56$, df = 2) and fetal heart rate in left lateral position and no significant association between other demographic and obstetrical variables at the level of confidence P < 0.05, hence hypothesis H₀₂ and H₀₃ was rejected with regard to complication during antenatal period. .
- There was a significant association between complication during antenatal period of antenatal women ($\chi^2 = 4.64$, df = 2) and fetal heart rate in semi fowlers position and no significant association between other demographic and obstetrical variables at the level of confidence P < 0.05, hence hypothesis H₀₂ and H₀₃ was rejected with regard to complication during antenatal period.

- There was no significant association between selected demographic and obstetrical variables and fetal movement in supine position at the level of confidence $P < 0.05$, hence hypothesis H_{02} and H_{03} was retained.
- There was no significant association between selected demographic and obstetrical variables and fetal movement in left lateral position at the level of confidence $P < 0.05$, hence hypothesis H_{02} and H_{03} was retained.
- There was no significant association between selected demographic and obstetrical variables and fetal movement in semi fowlers position at the level of confidence $P < 0.05$, hence hypothesis H_{02} and H_{03} was retained.
- There was a significant association between complication during antenatal period of antenatal women ($\chi^2 = 6.41$, $df = 2$) and fetal reactivity in supine position and no association between other demographic and obstetrical variables at the level of confidence $P < 0.05$, hence hypothesis H_{02} was retained and H_{03} was rejected with regard to complication during antenatal period.
- There was no significant association between selected demographic and obstetrical variable and fetal reactivity in left lateral position at the level of confidence $P < 0.05$, hence hypothesis H_{02} and H_{03} was retained.
- There was a significant association between type of family ($\chi^2 = 5$, $df = 1$) and fetal reactivity in semi fowlers position and no association between other demographic and obstetrical variable at the level of confidence $P < 0.05$, hence hypothesis H_{02} was rejected with regard to type of family and H_{03} was retained.
- Repeated measure of analysis of variance of mean fetal heart rate assessed at 5 and 15 minutes was (-53.1, -53.1), mean fetal movement was (-62.8, -62.9) and mean fetal reactivity was (-54.9, -54.7). This revealed that the result of

analysis of variance of non stress test parameters among antenatal women between three positions varied significantly. This finding was not consistent with H_{01} , hence the null hypothesis H_{01} was rejected.

- The study findings revealed that all the nurses were highly satisfied (100 %) with left lateral position and none of them reported dissatisfaction towards the position.

Recommendations

- The same study can be conducted on a large sample to generalize the results.
- A comparison can be made between primipara and multipara.
- A similar study can be conducted by using true experimental design.
- The same study can be conducted in different settings with similar facilities.
- A similar study can be conducted by using cross – over design.

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CHAPTER I

INTRODUCTION

Background of the Study

“Life is myth but the experiences are true”

- **Muhameed Munner**

Being pregnant and giving birth is likely crossing a narrow bridge, people can accompany you to the bridge and they can greet you on the other side but you walk that bridge alone. And the journey doesn't end there, children are the future of a society and special gifts to the world. Changes in our society and world require us to be attentive and value them and their health.

During pregnancy many physiological and psychological changes takes place inside the mother which may positively or negatively affect both the mother and baby. Every minute a woman loses her life due to pregnancy related complication, the annual toll is being 5 lakhs all over the world. India is confronted as the highest number of maternal deaths anywhere in the world with over 70,000 deaths due to pregnancy related complications as per 2008 census. 2010-2011 census of Tamil Nadu says that 0.9 per 1000 maternal deaths have occurred due to pregnancy related complications still there are some issues which should be taken care of.

A high risk pregnancy is one which puts the mother and the developing fetus at higher than normal risk during pregnancy or after delivery. High-risk complications occur in only

6 to 8 percent of all pregnancies. These complications can be serious and require special care to ensure the best possible outcome. A woman with a high risk pregnancy will need closer monitoring than the average pregnant woman. Such monitoring includes frequent antenatal visits, medical problem, blood test, serial ultrasound examination and fetal monitoring. These tests are designed to track the original condition and verify that the fetus is growing adequately and make decisions regarding whether labour may need to be induced to allow for early delivery of the fetus.

Mascarenhas, submitted an audit in the year 2012, at Pune, which shows that pregnancy induced hypertension was among the major causes of maternal mortality in the city. Eleven of the 39 maternal deaths between April 2011 to January 2012 were due to pregnancy induced hypertension.

In the year 2011, Lion's published a literature on current mortality rate, which shows that every day approximately 1000 women die from preventable causes related to pregnancy and childbirth and about 3,50,000 death occurs each year. In the year 2008, 3,58,000 women died during pregnancy and childbirth. Eighty percent of maternal deaths were due to direct causes. The major direct causes of maternal death in developing countries were severe bleeding, infection, hypertension, obstructed labour and unsafe abortion. A death were the consequences of pregnancy related complications or was caused by interventions, omissions, incorrect treatment or events that resulted from theses complications. Most maternal deaths could be prevented if women has been provided with proper provision and access to a continuum of care from home to health care facilities. The

empowerment of women, family and community should enhance necessary self care, as well as increase access to and utilization of quality skilled care.

An article was published in the year 2011, on “India’s Anemia Woes”, by Chidambarathanu, which revealed that anemia is a major killer in India. Statistics showed that every second Indian woman is anemic and one in every five maternal deaths is directly due to anemia. One in every two Indian women (56%) suffers from some form of anemia. Twenty percent of the maternal deaths are due to anemia which also indirectly contributes to another 40 % of maternal deaths. Maternal mortality is staggeringly high with a rate of 454 per every 100,000 live births.

Need for the Study

Pregnancy is an amazing phenomenon of nature. It is a revolutionary act and an evolutionary happening, in the manner of the silkworm getting transformed into some winged angel. Pregnancy links the mother and fetus together and is the basis for regenerating the generation. The fact of being pregnant is a precious one, it is a wonderful journey in a women’s life where she experiences many changes in her body which can prove to be both positive or negative.

About 80% of maternal deaths are due to direct causes and 20 % is due to indirect causes. In almost 23 studies, it has been found that, anemia was the direct cause of between 1 to 46% of maternal deaths, so screening and providing intervention in a correct time can save the life of these high risk mothers and the fetus.

Non stress test (NST) is a test to evaluate overall health of the fetus. It compares the fetus heart rate pattern in response to movement. It is an inexpensive test which makes it popular. The criterion for a reactive non-stress test is acceleration in the fetal heart rate of 15 beats per minute lasting for 15 seconds in 20 minutes duration.

Non stress test is a diagnostic procedure which is well practiced by nurse practitioners and midwives, it provides crucial information on the well being of the unborn baby. It helps the nurse to make rational decision and to reduce the perinatal mortality and provides an immediate answer for fetal distress. Midwives can play an important role in assisting the antenatal mothers who undergoes Non Stress Test by implementing various positions namely sitting, semi fowler's, left lateral and standing position. Realization of these relevance in different positions enable us to know the impact of positive aspects of these intervention. Implementing these positions could decrease the need for prolonged monitoring, thus leading to a more time effective evaluation of fetal risk.

Through self experience it is found that in most of the hospitals supine position is carried out for doing non stress test and in some patient the result is non reactive in supine position but when position is changed to left lateral the result shows reactive. These viewpoints motivated the researcher to experiment the effect of different maternal positions during non stress test.

High risk pregnancy requires proper screening and non stress test is a way to rule out pregnancies at risk such as Post dated pregnancy, Pregnancy induced hypertension, Anemia, Gestational diabetes mellitus, Polyhydramnios, Oligohydramnios etc where the screening should be done twice or more times in a week based on patients condition .

Cleaver et al., in the year 2011 conducted an experimental study to assess the effect of different maternal positions on non stress test where the authors revealed that supine position showed the least fetal activity with increased maternal back pain as well as shortness of breath. The authors further described that inaccurate results can contribute to prolonged hospital stays, anxiety and discomfort to the mother and family members.

An experimental study (2007) was conducted by Alus et al., to assess the effect of different maternal positions on non stress test. Experimental design with randomly assigned four positions supine, left lateral, semi fowlers and sitting up was used for the study. Four hundred eight women were selected as a sample from University Hospital in Turkey. Women were randomly assigned to four groups such as supine, left lateral, semi fowlers and sitting up in equal numbers of 102. The study results proved that supine position yields the lowest reactivity in tandem with physical discomfort such as back pain and difficulty in breathing. Sitting up, semi fowler and left lateral positions are recommended to be used during the non stress test.

In the year 2007, Tamas et al., conducted a study to determine the effect of maternal central hemodynamics on fetal heart rate patterns near term with special regard to the maternal body position. A total of 106 mothers with a gestational age of 36 – 39 weeks were selected for the study. Brief non stress test and bioimpedance cardiography were carried out in supine position, then repeated the same in a full left lateral decubitus position. Analysis of 100 complete registrations revealed a significant increase in number of

accelerations, overall short term variations and long high episodes with lower basal fetal heart rates in the lateral decubitus than in the supine position.

Bashtian et al., in the year 2006 conducted a clinical trial to assess the relationship between maternal position and result of non stress test among high risk pregnancy. Total 150 singleton pregnant women with gestational age between 32 – 42 weeks in Iran were selected as the study sample. The average maternal gestational age was 36.67 weeks and the majority of mothers were nulliparous (51.3%). At first the patients were randomly assigned to a semi fowler's position or left lateral position and then the positions were alternated. Fetal heart rate monitoring was performed for ten minutes. The study concluded with the findings that there were no significant correlation between both demographic characteristics and maternal positions(Semi Fowlers and Left Lateral Positions) with results of non stress test and either of the position could be used while performing a non stress test.

Supine position yields the lowest fetal reactivity in tandem with physical discomfort such as back pain, difficulty in breathing, etc. therefore sitting up, semi fowler's and left lateral positions are recommended to be used during non stress test. In addition, preferences of the pregnant women should also be determined before the test to minimize discomfort.

Statement of the Problem

A Pre Experimental Study to assess the Effect of Selected Maternal Positions upon Non Stress Test Parameters among Antenatal Women at Selected Hospital, Chennai.

Objectives of the Study

1. To determine the effectiveness of positions upon non stress test parameters among antenatal women.
2. To compare the effectiveness of various positions upon non stress test parameters among antenatal women.
3. To find out the association between the selected demographic variables and non stress test parameters in various positions among antenatal women.
4. To find out the association between the selected obstetrical variables and non stress test parameters in various positions among antenatal women.
5. To assess the level of satisfaction of the nurses regarding effect of positions upon the non stress test parameters among antenatal women.

Operational Definition

Effectiveness

In this study it refers to the expected and desired change in non stress test parameters after keeping antenatal women in supine position for 20 minutes followed by left lateral position for 20 minutes and then in semi fowlers position for 20 minutes when they come for antenatal checkup.

Maternal positions

In this study it refers to placing the antenatal women in supine position for 20 minutes followed by left lateral position for 20 minutes and semi fowlers position for 20 minutes to find its effect on fetal heart rate, fetal movement and fetal reactivity.

Non stress test parameters

In this study it refers to the observation of fetal heart rate, fetal movement and fetal reactivity for a period of 20 minutes in supine, left lateral and semi fowlers position.

Antenatal women

In this study it refers to the antenatal women between gestational age of 32 – 42 weeks having high risk pregnancy like anemia, pregnancy induced hypertension, post dated pregnancy, polyhydramnios, oligohydramnios, gestational diabetes mellitus etc.

Assumption

The study assumes that

- Fetal heart rate is an indicator of fetal wellbeing.
- Fetal sleep can cause alteration in fetal heart rate.
- Left lateral position reduces chance of supine hypotensive syndrome in antenatal women.
- Positional changes can alter cardio – respiratory physiological status.

Null Hypotheses

H₀₁ – There will be no significant difference in non stress test parameters between the positions.

H₀₂ – There will be no significant association between the selected demographic variables and non stress test parameters in selected positions of antenatal women.

H₀₃ – There will be no significant association between the selected obstetrical variables and non stress test parameters in selected positions of antenatal women.

Delimitations

The study was limited to antenatal women who were

- between 32 – 42 weeks of gestation.
- having high risk pregnancy.
- willing to participate in the study.
- able to understand hindi, english and tamil.

Conceptual Framework

The conceptual framework deals with the inter related concepts that are assembled together in some rational schemes by virtue of thesis relevance to a common theme (Polit and Beck, 2004).

The conceptual framework of the present study was based on “King’s Goal Attainment Model”(1981). This model addresses process of action, reaction, interaction whereby nurses and clients share information about their perception. Through perception and communication they identify the problems through which they set goals and take necessary action.

The framework was selected for the present study as it provides a way of understanding and providing throughout the concepts of perception, judgement, action, reaction, interaction, transaction and feedback between the nurse and the antenatal women in between 32-42 weeks of gestation, the components of the model incorporated in the study are as follows:

Perception

A person imparts energy from the environment and transforms processes and stores it. The study assumed that there was interpersonal relationship between researcher and the antenatal women in between 32 – 42 weeks of gestation. The nurse researcher and antenatal women perceived the need of awareness regarding proper screening and affect of high risk factors in pregnancy outcome.

Judgement

Analyze the area of action which can be carried out. The nurse researcher and antenatal women analyzed the need of screening and awareness during high risk pregnancy which can affect pregnancy outcome.

Action

Individual exports the perceived energy as demonstrated by observable behavior by taking mental or physical action. In this study the nurse researcher plans to advise mother to opt for non stress test. The mother gives consent and readiness to undergo non stress test.

Reaction

Reaction means developing action and acting on perceived choices for goal attainment. Both the nurse researcher and the participants planned for reaction. For the experimental group efforts were taken to undergo non stress test and find out the possible position for both mother and baby during the test by computing fetal parameters(fetal heart rate, fetal movement and fetal reactivity).

Interaction

Refers to verbal and non verbal behavior between an individual and the environment or between two or more individuals. It involves goal directed communication. Action leads to interaction where the researcher places the antenatal women in different positions (supine, left lateral and semi fowlers) for a period of 20 minutes each.

Transaction

Imogene King believed that transaction is the mutually defined goals of two or more individuals and the means to achieve them. They reach an agreement about how to attain these goals and then set about to realize them. Thus the nurse researcher and the antenatal women mutually set a goal to undergo non stress test during high risk pregnancy.

Feedback

The outcome may either be satisfactory or unsatisfactory. Satisfactory position indicates a position where all the parameters of non stress test (fetal heart rate, fetal movement and fetal reactivity) will be within normal range. Unsatisfactory indicates where positioning in non stress test leads to rearrangement of positioning.

Researcher adopted this model and perceived apt in enabling to assess the effectiveness of selected maternal positions on non stress test parameters among antenatal women.

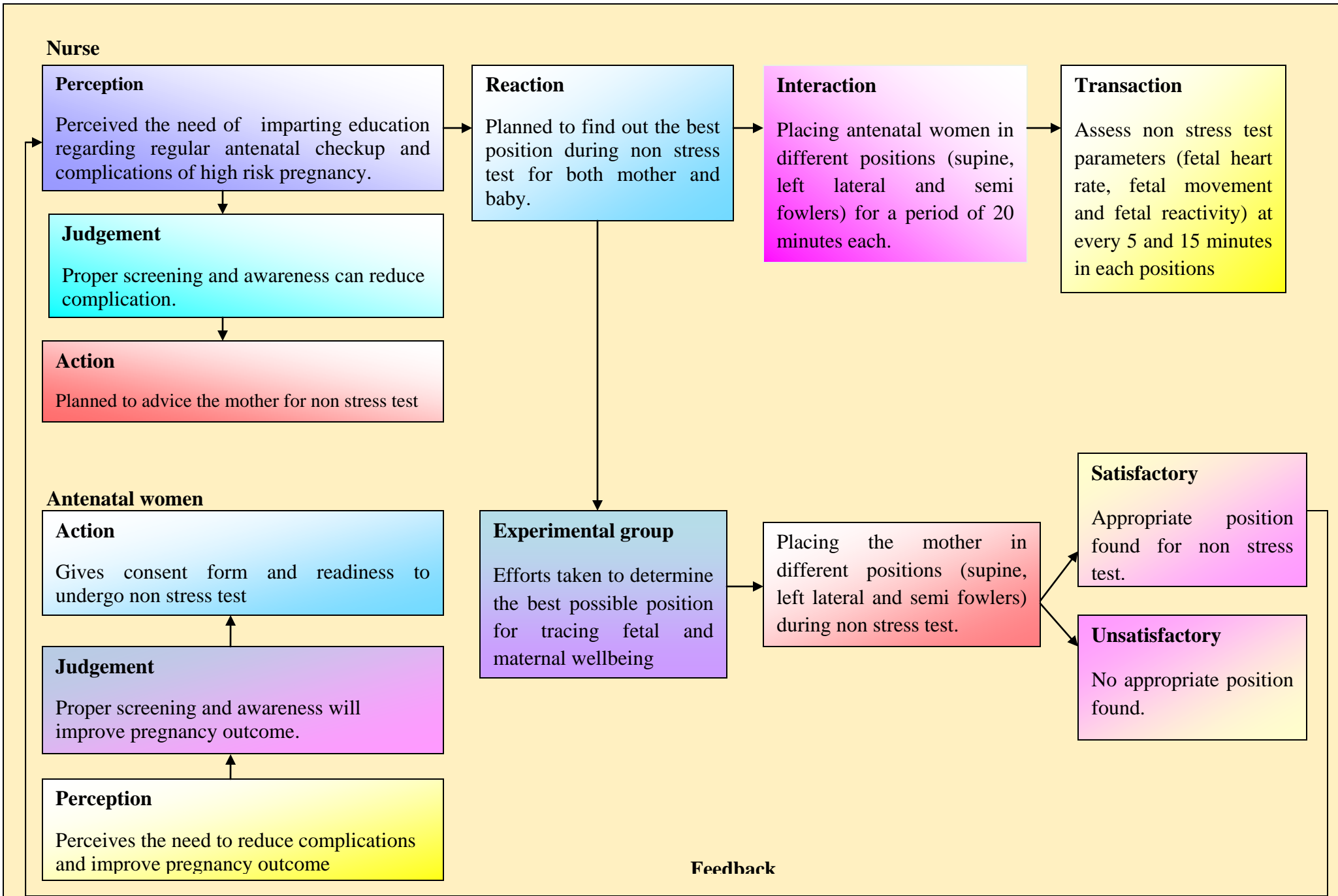


Fig.1 Conceptual Framework Based On King's Goal Attainment Model (1981)

Projected Outcome

The study projects that antenatal women with an appropriate position will maintain desired fetal heart rate, fetal movement and fetal reactivity.

Summary

This chapter has dealt with the background, need for the study, statement of the problem, objectives, operational definitions, assumptions, null hypothesis, delimitations and conceptual framework.

Organization of the Report

Further aspects of the study are presented in the following chapters

Chapter II : Review of Literature

Chapter III : Research methodology which includes research approach, research design, setting, population, sample and sampling technique, tool description, validation and reliability of tools, pilot study, data collection procedure and plan for data analysis.

Chapter IV : Analysis and interpretation of the data.

Chapter V : Discussion

Chapter VI : Summary, conclusion, implication and recommendation.

CHAPTER II

REVIEW OF LITERATURE

A critical summary of research on a topic of interest, often prepared to put a research problem in context (Polit, 2010).

The review of literature provides information, ideas, data and evidence to the researcher written from a particular standpoint to fulfill certain aims or express certain views on the nature of the topic and how it is to be investigated and the effective evaluation of these documents in relation to the research being proposed.

This chapter deals with the review of published research studies and related materials for the present study. The review helped the investigator in building the foundation of the study. It helped the researcher to find out the accurate data that could be used for supporting the present study and drawing conclusions.

The review of literature in this chapter is presented under the following headings

- Literature related to maternal mortality due to high risk pregnancy.
- Literature related to factors affecting pregnancy outcome.
- Literature related to high risk pregnancy and non stress test.
- Literature related to effectiveness of maternal positioning upon non stress test parameters.

Literature related to Maternal Mortality due to High Risk Pregnancy

Mascarenhas, submitted an audit in the year 2012 at Pune, which shows that pregnancy induced hypertension was among the major causes of maternal mortality in the city. Eleven of the 39 maternal deaths between April 2011 to January 2012 were due to pregnancy induced hypertension.

In the year 2011, Lion's published a literature on current mortality rate, which shows that every day approximately 1000 women die from preventable causes related to pregnancy and childbirth and about 3,50,000 death occurs each year. In the year 2008, 3,58,000 women died during pregnancy and childbirth. Eighty percent of maternal deaths were due to direct causes. The major direct causes of maternal death in developing countries were severe bleeding, infection, hypertension, obstructed labour and unsafe abortion. A death were the consequences of pregnancy related complications or was caused by interventions, omissions, incorrect treatment or events that resulted from these complications. Most maternal deaths could be prevented if a woman has been provided with proper provision and access to a continuum of care from home to health facilities. The empowerment of women, family and community should enhance necessary self care, as well as increased access to and utilization of quality skilled care.

An article was published in the year 2011, on "India's Anemia Woes", by Chidambarathanu, which revealed that anemia is a major killer in India. Statistics showed that every second Indian woman is anemic and one in every five maternal deaths is directly due to anemia. One in every two Indian women (56%) suffers from some form of anemia.

Twenty percent of the maternal deaths are due to anemia, it also indirectly contributes to another 40% of maternal deaths. Maternal mortality is staggeringly high with a rate of 454 per every 100,000 live births.

Literature related to Factors Affecting Pregnancy Outcome

In the year 2009, Sabin et al., conducted an experimental study to assess the relationship between maternal education and fetal deaths, the results of the study showed a decreasing trend of fetal deaths with an increase in maternal education, ranging from 46 percent in women who had no schooling to 19 per cent in women who were postgraduate. Factors relating to the care of women, environmental hygiene, sanitation, household, food security and poverty are all likely to operate simultaneously with a low level of maternal literacy which may directly or indirectly affect fetal outcomes.

Hoare et al., in the year 2004 published a research article which showed that low socio economic status may affect the nutritional status of the pregnant women which in turn influences the growth, physical and mental development of the fetus. Optimising nutritional status before, during and after pregnancy is important. The pregnant woman needs to have sufficient energy and nutrient supply from diet and reserve adequate energy to maintain her own health as well as for the growing fetus.

Literature related to High Risk Pregnancy and Non Stress Test

Bashtian et al., in the year 2006 conducted a clinical trial to assess the relationship between maternal position and result of non stress test among high risk pregnancy. Total

150 singleton pregnant women with gestational age between 32 – 42 weeks in Iran were selected as the study sample. The average maternal gestational age was 36.67 weeks and the majority of mothers were nulliparous (51.3%). At first the patients were randomly assigned to a semi fowler's position or left lateral position and then the positions were alternated. Fetal heart rate monitoring was performed for ten minutes. The study concluded with the findings that there were no significant correlation between both demographic characteristics and maternal positions (Semi Fowlers and Left Lateral Positions) with results of non stress test and either of the position could be used while performing a non stress test.

In the year 2004, Roghaei et al., conducted a clinical trial study to evaluate the results of non stress test in two positions among high risk pregnant women. The high risk mothers between gestational age of 32 – 42 weeks who were referred to Alzahara and Shahid Baheshti Medical Centres for prenatal care were selected as the study sample. One hundred twenty five mothers were selected by simple random sampling technique. They said that non stress test is a way to evaluate fetal wellbeing. It is based on acceleration of fetal heart rate during fetal movement. In high risk pregnancies such as Post dated pregnancy, Diabetes mellitus, Oligihydramnios and Polyhydramnios it should be done two or more times a week, based on patients condition. Sometimes we need to continue the test 40 – 90 minutes to see the acceleration. This study was performed to know the effects of maternal position on the non stress test results and determine the best position for the test. Non stress test was done two times for each patient. In the first time mothers were placed in semi fowlers position for 10 minutes and second time left lateral position in first

10 minutes. In the first time 68% of tests were reactive in semi fowlers position and 64.8% in left lateral position. Second time 64.8% results were positive in semi-fowlers position and 48.8% in left lateral position. The difference was significant ($P = 0.006$). Totally reactive results were shown in semi fowlers position (42.8%) and in left lateral (37.6%), the difference was significant. The study showed that there is a relation between maternal position and non stress test results and there are more reactive results in semi fowler position.

Literature related to Effectiveness of Maternal Positioning upon Non Stress Test Parameters

Cleaver et al., in the year 2011 conducted an experimental study to assess the effect of different maternal positions on non stress test where the authors revealed that supine position showed the least fetal activity with increased maternal back pain as well as shortness of breath. The authors further described that inaccurate results can contribute to prolonged hospital stays, anxiety and discomfort to the mother and family members.

Balabet et al., in the year 2010 conducted an experimental study to assess the effect of maternal positions upon fetal biophysical profile, where he randomly assigned pregnant mothers to a sitting first (semi fowler position) or supine first (left lateral recumbent position). Ten minutes of fetal heart rate monitoring was performed in each position at each visit. The result showed that there was more period of non reactivity in the supine position (45.0% vs 34.6%; $P = .001$). Overall, patients who were examined in the supine position first were 1.8 times more likely ($P < .05$) to have a change from a non reactive to reactive

result when the position was switched after 10 minutes than those who were examined sitting first. They concluded that semi fowler's position is a superior position for conducting a non stress test in a short period. Use of this position could decrease the need for prolonged monitoring, thus leading to a more time effective evaluation of fetal risk. The outcomes were similar when the left lateral tilt group was compared with semi fowlers position. Lateral tilting of gravidas in semi fowler's position during non stress testing is thus supported to avoid hypotensive syndrome.

In the year 2007, Tamas et al., conducted a study to determine the effect of maternal central hemodynamics on fetal heart rate patterns near term with special regard to the maternal body position. A total of 106 mothers with a gestational age of 36 – 39 weeks were selected for the study. Brief non stress test and bioimpedance cardiography were carried out in supine position, then repeated the same in a full left lateral decubitus position. Analysis of 100 complete registrations revealed a significant increase in number of accelerations, overall short term variations and long high episodes with lower basal fetal heart rates in the lateral decubitus than in the supine position.

An experimental study (2007) was conducted by Alus et al., to assess the effect of different maternal positions on non stress test. Experimental design with randomly assigned four positions supine, left lateral, semi fowlers and sitting up was used for the study. Four hundred eight women were selected as a sample from University Hospital in Turkey. Women were randomly assigned to four groups such as supine, left lateral, semi fowlers and sitting up in equal numbers of 102. The study results proved that supine position yields

the lowest reactivity in tandem with physical discomfort such as back pain and difficulty in breathing. Sitting up, semi fowler and left lateral positions are recommended to be used during the non stress test.

Clin et al., in the year 2007 conducted an experimental study to assess the effect of maternal positions on non stress test, where the authors suggested that supine position yields the lowest fetal reactivity. Relevance to clinical practice sitting up, semi fowlers and left lateral positions are recommended to be used during the non stress test.

A study to assess the effect of maternal positions during non stress test and fetal heart rate patterns was conducted in the year 2005, by Cito et al. A total of 1055 non stress test lasting 20 minutes were performed in 368 mothers with low risk pregnancy. On the basis of maternal positions during non stress test, three groups were formed reclining, sitting and walking. The cardiotocographic parameters considered were number of fetal reactivity, fetal movements, baseline fetal heart rate, large accelerations, variable decelerations and dubious non stress test in a period of 20 minutes. The test results concluded with the finding that fetal reactivity in sitting position or during walking is quickly observed than in other positions.

Luisi et al., in the year 2005 conducted an experimental study to assess the relationship between hemodynamic changes and maternal positions where the authors have described that hemodynamic change can occur in women who are in semi fowlers position without a left lateral tilt. So the investigators clinically suggested that lateral tilting of

gravidas in semi fowlers position during non stress test is supported to avoid hypotensive symptoms.

A randomized clinical trial (2000) was conducted by Ely Nathan et al., to assess the relationship of maternal positions to the results of brief non stress test. The study results concluded with the findings that semi fowlers position should be considered as the superior position for conducting non stress test, as using this position could decrease the need for prolonged monitoring leading to a more time effective evaluation of patients at risk.

In the year 1986, Baker et al., conducted a comparative study between supine and left lateral position upon non stress test, where they have described that group of patients with a supine position demonstrated an associated compression of abdominal aorta by the pregnant uterus but not in lateral position. The study showed that for some patients the results were non reactive in semi fowlers position but when the position was changed to left lateral position the result shows reactive non stress test.

A study was conducted in the year 1983, by Friedman et al., to assess the effect of different maternal positions during non stress test on maternal and fetal biophysical parameters among antenatal mothers. The test was evaluated in 14 normal pregnancies between the gestational age of 38 – 48 weeks. Each woman was studied twice in both standing and left lateral recumbent position for a period of 30 min. The test results concluded with the finding that supine position yields the lowest fetal reactivity in tandem with physical discomfort such as back pain, difficulty in breathing etc. therefore sitting up, semi fowler's and left lateral positions were recommended to be used during non stress test.

Summary

This chapter deals with the review of literature related to the problem stated. The literatures were taken from the 15 primary and 2 secondary sources. It helped the researcher to develop tools, collect data, organize and analyze the data.

CHAPTER III

RESEARCH METHODOLOGY

The methodology of the research study is defined as the way the data are gathered in order to answer the question to analyze the research problem. It enables the researcher to project a blueprint of the research undertaken. The research methodology involves a systematic procedure by which a researcher has a start from the initial identification of the problem to its final conclusion.

The present study was conducted to assess the effectiveness of selected maternal positions upon non stress test parameters among antenatal women. It deals with a brief discussion of different steps undertaken by the researcher for the study. It involves research approach, setting, population, sample, sampling technique, selection of the tool, content validity, reliability, pilot study, data collection procedure and plan for data analysis.

Research Approach

Research approach is the most significant part of any research. The choice of the research approach depends on the purpose of research study which is undertaken.

According to Polit and Beck (2008) experimental research is an extremely applied form of research approach and involves finding out how well a program and practice of policy are working. Its goals are to assess or evaluate the success of the intervention. In this study the researcher wanted to assess the effectiveness of selected maternal positions upon non stress test parameters among antenatal women. After review of various literatures the researcher found

that the pre experimental approach is considered to be the most appropriate approach for the study.

Research Design

Research design is the overall plan for addressing a research question, including specifications for enhancing the study's integrity Polit and Beck (2008).

Time series design with multiple institution of treatment was selected for the antenatal women where the researcher manipulated independent variable which includes selected maternal positions upon non stress test parameters which was administered to the same group of antenatal women. After making the antenatal women comfortable the experiment started with the women in supine position for 20 minutes followed by left lateral position for 20 minutes followed by semi fowlers position for 20 minutes. During each position non stress test parameters were recorded at 5 and 15 minutes for antenatal women while attending outpatient department in St. Antony's Hospital. Finally the effectiveness of maternal positions upon fetal heart rate, fetal movement and fetal reactivity using observation checklist was computed.

The research design is represented diagrammatically as follows

X1 O1 O2 X X2 O3 O4 X X3 O5 O6

X 1 - positioning the antenatal women in supine position for 20 minutes.

O1 - observation of non stress test parameters for 5 minutes in supine position.

- O2 - observation of non stress test parameters for 15 minutes in supine position.
- X2 - positioning the antenatal women in left lateral position for 20 minutes.
- O3 - observation of non stress test parameters for 5 minutes in left lateral position.
- O4 - observation of non stress test parameters for 15 minute in left lateral position
- X3 – positioning the antenatal women in semi fowlers position for 20 minutes.
- O5 - observation of non stress test parameters for 5 minutes in semi fowlers position.
- O6 - observation of non stress test parameters for 15 minutes in semi fowlers position.

Variables

Variable is an attribute that varies, that is taken on different values (**Polit, 2010**).

Independent variable

The variable that is believed to cause or influence the dependent variable is called independent variable. In this study selected maternal position is the independent variable. Maternal positions (supine, left lateral and semi fowlers) were changed in every 20 minutes to observe a desirable change in fetal heart rate, fetal movement and fetal reactivity by using observational checklist.

Dependent variable

The variable hypothesized to depend on or be caused by independent variable is the dependent variable. Non stress test parameters is the dependent variable in this study.

Change in fetal heart rate, fetal movement and fetal reactivity was computed for a period of 20 minutes in each of selected maternal positions.

Extraneous variables

A variable that confounds the relationship between the independent and dependent variables and that needs to be controlled either in the research design or through statistical procedures is the extraneous variables. Demographic variables and obstetrical variables were extraneous variables in this study.

Research Setting

The study was conducted at St. Antony's Hospital located at Madhavaram which is a semi-urban area of Chennai. The hospital is 200 bedded which has labour room with four labour table and equipments like carditocography machine, warmer, life saving drugs and equipments for Obstetrical and Medical Emergencies. On an average 80 – 100 primigravidae undergo normal vaginal delivery every month. The hospital also has postnatal ward, post operative ward, NICU, operation theatre, laboratory and other diagnostic facilities like scanning. They also provide immunization and conduct teaching programmes for the staffs and the patients and do referral to government agencies in need.

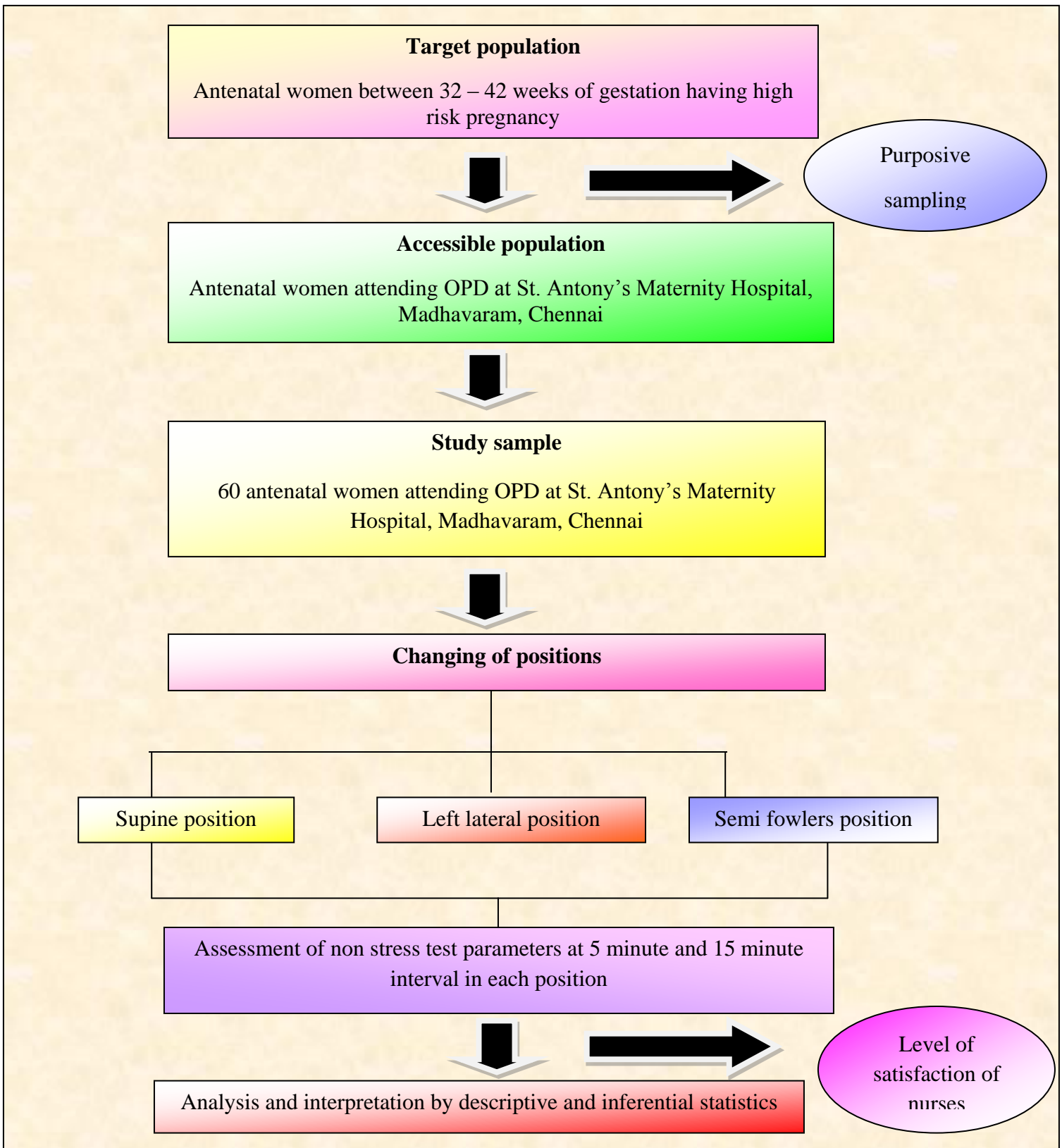


Fig 2 .Schematic Representation of the Research Design

Population

Population is the entire set of individuals or objects having some common characteristics (Polit and Beck, 2010). The target population is the entire population in which a researcher is interested and to which he or she would like to generalize the study results. In this study the target population comprises of antenatal women between 32 – 42 weeks of gestation who satisfy the inclusion criteria. The accessible population is the aggregate of cases that conform to designated criteria and that are accessible as subjects for a study. In this study the accessible population was antenatal women between 32 – 42 weeks of gestation admitted in St. Antony's maternity hospital, Chennai.

Sample

According to Polit and Beck (2010) sample is a subset of population elements. A sample of 60 antenatal women between 32 – 42 weeks of gestation who satisfies the inclusion criteria was selected for the study.

Sampling Technique

Sampling is the process of selecting a portion of the population to represent the entire population so that inferences about the population can be made (Polit and Beck 2010). Non probability purposive sampling technique was used in this study to select 60 antenatal women who satisfy the inclusion criteria. In non probability purposive sampling technique the researcher selects a participant who fulfils the sampling criteria.

Sampling Criteria

Inclusion criteria

The study includes antenatal women who were

- between 32 – 42 weeks of gestation.
- having high risk pregnancy.
- willing to participate in the study.
- able to understand hindi, english and tamil.

Exclusion criteria

The study excluded

- antenatal women with normal past and present obstetrical history.
- antenatal women having gestational age below 32 weeks .
- who are not willing to participate in the study.

Selection and Development of Study Instrument

The study aimed at evaluating the effectiveness of selected maternal positions upon non stress test parameters. Data collection instruments will be developed through extensive review of literature and consultation with experts and guidance of faculty members. The instruments to be used are demographic and obstetrical variable proforma, observational checklist and rating scale on satisfaction of nurses regarding positions on non stress test parameters.

Demographic variable proforma

The demographic variable proforma consists of age in years, educational status, religion, occupation, type of family, family income per month in rupees, residential area, nature of work, place of work, diet and personal habits.

Obstetrical variable proforma

The obstetrical variable proforma consists of height in cms, weight in kg, gravida, parity, antenatal checkup, gestational age in weeks, any complication during antenatal period and previous obstetrical history.

Observational checklist

Observational checklist consists of the information regarding non stress test parameters like fetal heart rate, fetal movement and fetal reactivity.

Rating scale on level of satisfaction

The rating scale on level of satisfaction regarding position consists of 12 statements. These statements are categorized into satisfaction regarding intervention in supine, left lateral and semi fowlers position. These responses extend from highly satisfied (score = 4), satisfied (score = 3), dissatisfied (score = 2) and highly dissatisfied (score = 1).

The rating scale scores are classified into four levels for each position as follows

Score	Percentage	Interpretation
< 3	1 – 25 %	Highly dissatisfied
3 - 6	26 – 50 %	Dissatisfied
7 - 9	51 – 75 %	Satisfied
10 - 12	76 – 100 %	Highly satisfied

Psychometric Properties of the Instruments

Validity of the instruments

Validity is the degree to which an instrument measures what it is intended to measure (Polit, 2010). The constructed tool was given to six experts in the field of nursing. The evaluators had suggested some modification in obstetrical variable proforma and observational checklist. The modifications and suggestions of experts were incorporated in final preparation of tool.

Reliability of the instruments

Reliability is the degree of consistence or dependability with which an instrument measures an attribute (Polit 2010). The reliability of the tools was determined by using split half method. Karl Pearson's 'r' was computed for finding out reliability.

Rating scale for nurses satisfaction – Split half method (r = 0.86)

Pilot Study

Pilot study is a small scale version or trial run done in preparation for a major study (Polit, 2004). The purpose of the pilot study was to find out the feasibility and practicability of study design. The pilot study was conducted at St. Antony's Hospital, Chennai by selecting 10 antenatal women who satisfy the inclusion criteria using non probability purposive sampling technique in order to assess the methodology and tool. Non stress test parameters in each positions was computed by using observational checklist. After making the antenatal women comfortable the experiment started with the antenatal women in supine position for 20 minutes followed by left lateral position for 20 minutes followed by semi fowlers position for 20 minutes. During each position non stress test parameters (fetal heart rate, fetal movement and fetal reactivity) was recorded at 5 and 15 minutes interval when the antenatal women came to outpatient department. After the pilot study, it was found to be feasible and effective and the study instruments were found to be appropriate.

Protection of Human Rights

The study was conducted

- after the approval of ethical committee of Apollo Hospitals
- after obtaining written consent from the participants
- with confidentiality throughout the study.

Data Collection Procedure

Data collection is gathering information about something which the researcher has chosen to explore or investigate (Crookes and Davies, 1998).

The data collection was done for a period of 1 month. Formal permission was obtained from the administration of St. Antony's Hospital and was informed and explained about the study and the formal permission was taken. Then the researcher filled demographic and obstetrical variable proforma and enlisted the name of antenatal women between 32 – 42 weeks of gestation having high risk pregnancy registered under that centre.

Sixty samples who satisfied the inclusion criteria was selected for the study. The researcher introduced herself and explained the purpose of the study to the antenatal women who were coming in antenatal outpatient department for non stress test. Consent was obtained from antenatal women and confidentiality was assured. Data collection procedure was explained to the staff nurses who were in antenatal outpatient department. The researcher collected data from 8am – 4 pm, daily during the study period. After making the antenatal women comfortable the experiment started with the antenatal women in supine position for 20 minutes followed by left lateral position for 20 minutes followed by semi fowlers position for 20 minutes. During each position non stress test parameters (fetal heart rate, fetal movement and fetal reactivity) was recorded at 5 and 15 minutes interval when the antenatal women came to outpatient department. Finally the effectiveness of each positions upon non stress test parameters was computed.

Problems Faced During Data Collection

The problems faced during data collection were,

- Lack of time of nurses to participate in the study.
- Few patients were not interested to provide information.
- Few patients had too much difficulty to lie down in supine position.

Plan for Data Analysis

Data analysis is the systematic organization, synthesis of research data and testing of hypothesis using those data (Polit and Beck, 2010).

Analysis and interpretation of the data was carried out by using descriptive and inferential statistics. Descriptive statistics such as frequency, distribution, percentage, mean, standard deviation and inferential statistics like repeated analysis of variance and chi – square were used to analyze the data.

Summary

This chapter has dealt with research approach, design, setting, population, sample, sampling technique, inclusion and exclusion criteria, selection and development of study instruments, validity and reliability of the study instrument, pilot study, data collection procedure, problems faced during data collection and plan for data analysis.

CHAPTER – IV

ANALYSIS AND INTERPRETATION

Statistics are aggregates of facts, affected to a marked extent by multiplicity of causes, numerically expressed, enumerated or estimated according to reasonable standards of accuracy, collected by systematic manner for a predetermined purpose and placed in relation to each other (Agarwal, 2010).

Data was collected from 60 antenatal women to determine the effectiveness of selected maternal positions upon non stress test parameters. The data were analysed using descriptive and inferential statistics based on the objectives and hypothesis. The data analysis was completed after transferring all the data to the master coding sheet.

Organisation of the Findings

The findings of the study were organized and presented under the following headings

- Frequency and percentage distribution of demographic and obstetrical variables of the antenatal women.
- Comparing mean and standard deviation of non stress test parameter of antenatal women in supine, left lateral and semi fowlers position.
- Association between selected demographic and obstetrical variable with the fetal heart rate, fetal movement and fetal reactivity in supine position, left lateral and semi fowlers position .

Table 1**Frequency and Percentage Distribution of Demographic Variables of Antenatal Women****(N = 60)**

Demographic Variable	Frequency(f)	Percentage (p)
Age in years		
16 – 20	7	11.7
21 – 25	27	45
26 – 30	21	35
>31	5	8.3
Religion		
Hindu	49	81.7
Christian	2	3.3
Muslim	9	15
Occupation		
House wife	60	100
Employee	-	-
Family income per month in rupees		
≤ 5000	22	36.7
5001 – 10,000	25	41.6

Residential area		
Rural	6	10
Semiurban	38	63.3
Urban	16	26.7
Place of work		
Indoor	60	100
Outdoor	-	-
Nature of work		
Sedentary workers	-	-
Moderate workers	60	100
Heavy workers	-	-
Diet		
Vegetarian	-	-
Non vegetarian	60	100
Personal habits		
Tobacco chewing	-	-
Smoking	-	-
Alcohol	-	-
None	60	100

Table 1 interprets that all of them (100%) were housewife, vegetarian, worked in indoor area as moderate workers with no any bad personal habits. Majority of them were Hindus (81.7%), most of them resided in semiurban area (63.3%) and had nuclear family (60%). Significant percentages of the antenatal women were between the age group of 21 - 25 years (45%) with a family income per month between 5001-10,001 rupees (41.6%).

Figure .3 reveals that significant percentage of the antenatal women were graduates and above (41.7%) respectively.

Figure .4 shows that most of the antenatal women belonged to nuclear family (60%).

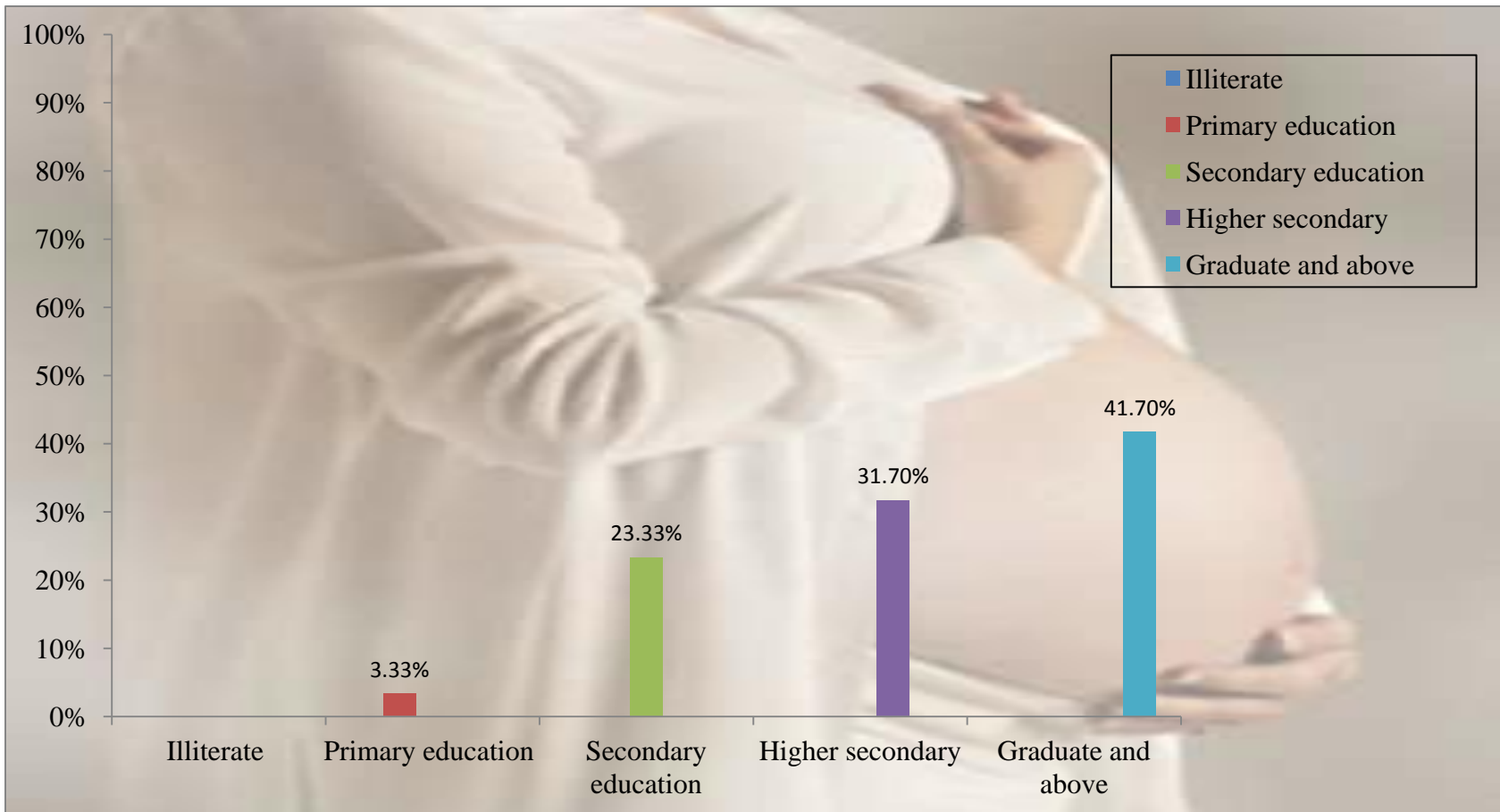


Fig .3 Percentage distribution of educational status of antenatal women

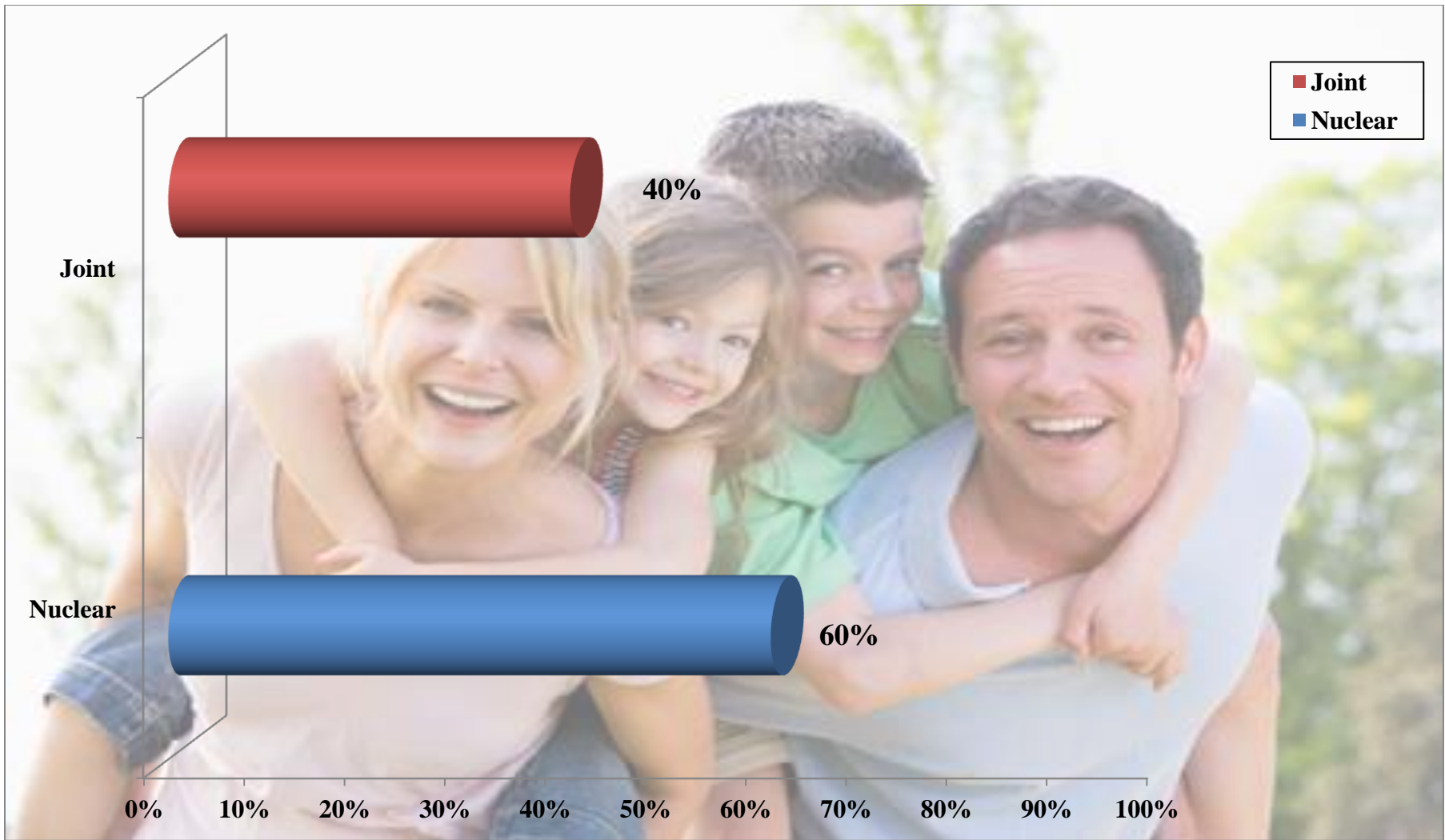


Fig. 4 Percentage distribution of type of family of antenatal women

Table 2**Frequency and Percentage Distribution of Obstetrical Variables of Antenatal Women****(N = 60)**

Obstetrical Variable	Frequency(f)	Percentage (p)
Height in cms		
≤ 140	-	-
141 – 160	34	56.7
161 – 180	24	40
> 180	2	3.3
Weight in kg		
≤ 40	1	1.7
41 – 60	15	25
61 - 80	40	66.6
> 80	4	6.7
Gravida		
Primigravida	41	68.3
Multigravida	19	31.7
Parity		
0	44	73.3
1	16	26.7
2	-	-
≥ 3	-	-

Antenatal checkup		
Regular	60	100
Irregular	-	-
Previous obstetrical history		
Abortion	15	25
Stillbirth	-	-
Congenital anomaly	-	-
No complication	45	75

The data presented in Table 2 depicts that all of them (100%) of them had regular antenatal checkup, majority of them were primipara(73.3%) with no any previous obstetrical history(75%), most of them had weight between 61-80kg (66.6%) were primigravida(68.3%) and significant percentage of the antenatal women were in a height of 141 – 160 cm (56.7%).

Figure. 5 represents that significant percentage of the antenatal women had gestational age above 37 weeks (41.7%) and (35%) of them were between 35 – 37 weeks.

Figure. 6 infers that majority of antenatal women had anemia (85%) and significant percentage of them had pregnancy induced hypertension (10%) while others had no complications(5%).

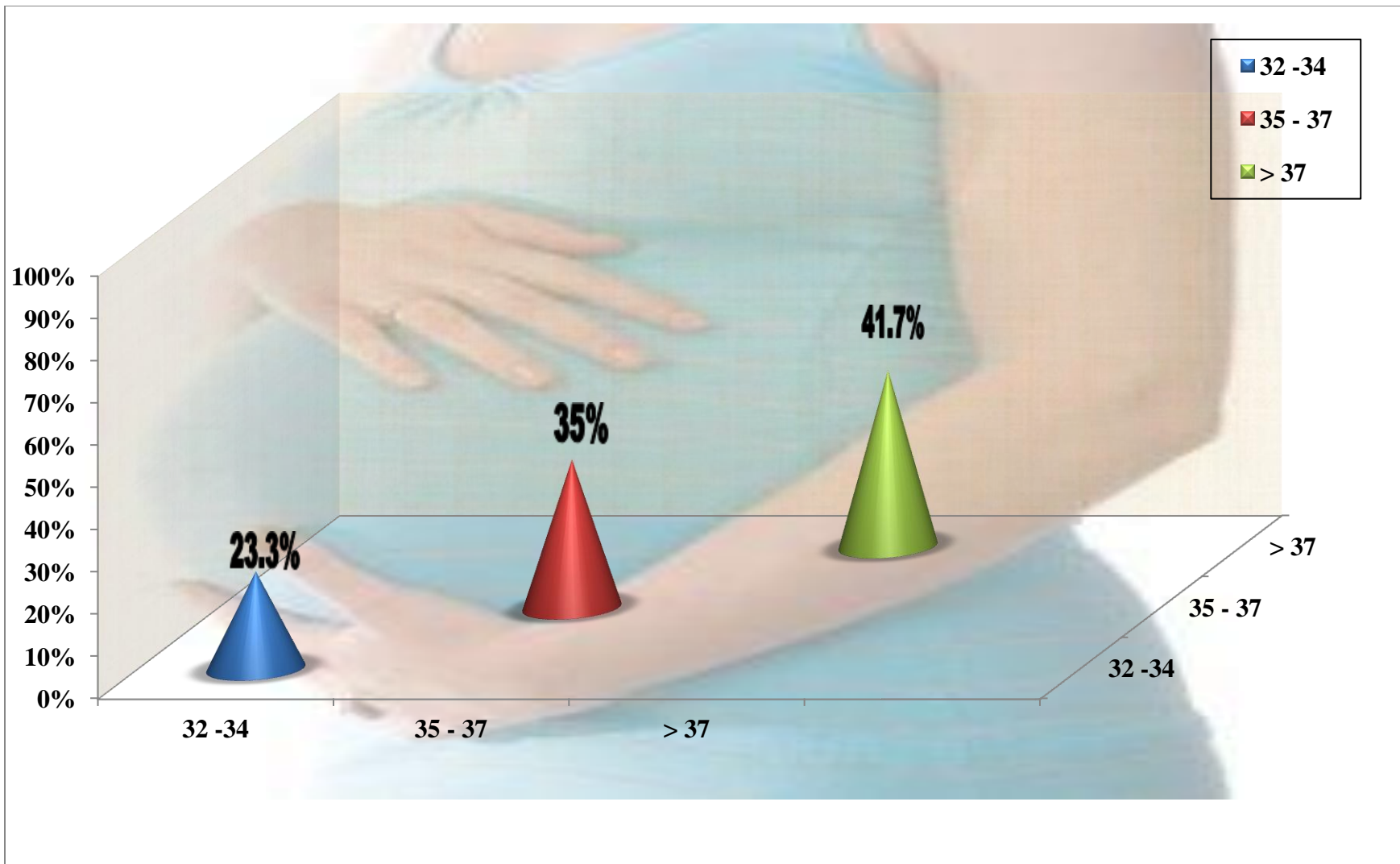


Fig. 5 Percentage distribution of gestational age in weeks of antenatal women

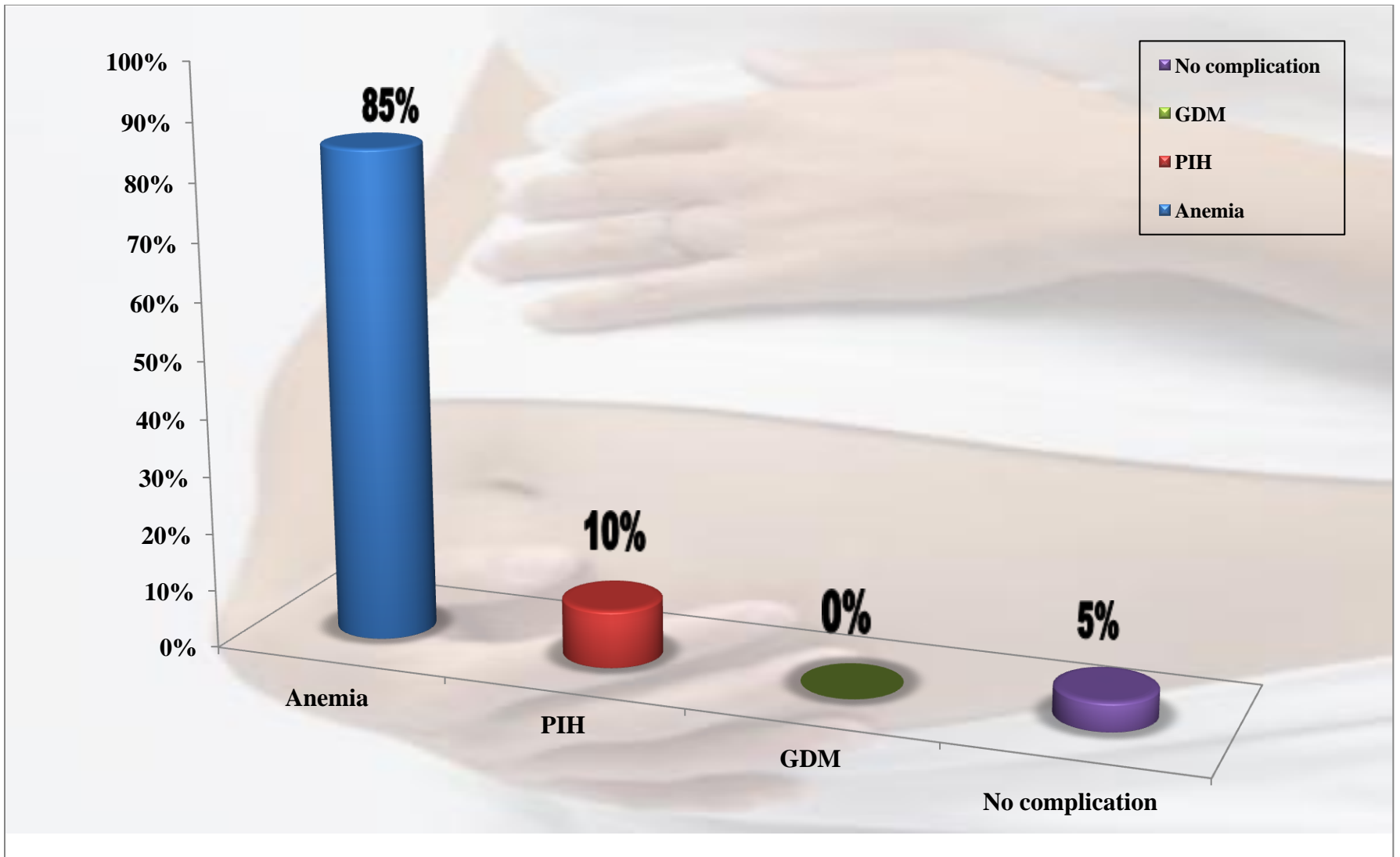


Fig .6 Percentage distribution of complications during antenatal period in antenatal women

Table 3**Comparison of Mean and Standard Deviation of Non Stress Test Parameters of Antenatal Women in Supine, Left Lateral and Semi Fowlers Position****(N = 60)**

Group	Observation	Mean	Standard Deviation
Supine position			
Fetal heart rate	5 min	134.5	12.5
	15 min	133.9	11.8
Fetal movement	5 min	1.08	1.09
	15 min	1.91	1.95
Fetal reactivity	5 min	1.23	0.74
	15 min	1.73	1.05
Left lateral position			
Fetal heart rate	5 min	143.06	8.53
	15 min	143.2	8.37
Fetal movement	5 min	2.11	2.29
	15 min	3.11	3.62
Fetal reactivity	5 min	1.6	1.05
	15 min	2.51	1.30
Semi fowlers			
Fetal heart rate	5 min	143.2	9.12
	15 min	142.6	8.96

Fetal movement	5 min	2.13	2.12
	15 min	2.96	3.07
Fetal reactivity	5 min	1.35	0.81
	15 min	2.55	1.41

The data in table 3 infers that among the antenatal women assessed at 5 minutes and 15 minutes the mean fetal heart rate was ($M = 134.5$, $SD = 12.5$) and ($M = 133.9$, $SD = 11.8$), the mean fetal heart rate of them was between 134.5 to 133.9 beats/minute in supine position, similarly in left lateral position, mean fetal heart rate at 5 minutes and 15 minutes was ($M = 143.06$, $SD = 8.53$) and ($M = 143.2$, $SD = 8.37$), so the mean fetal heart rate in left lateral position was between 143.06 to 143.2 beats /minute. In semi fowlers position the mean fetal heart rate at 5 minutes and 15 minutes was ($M = 143.2$, $SD = 9.12$) and ($M = 142.6$, $SD = 8.96$), so the mean fetal heart rate was between 143.2 to 142.6 beats / minute in semi fowlers position. It shows that antenatal women in left lateral position had highest mean fetal heart rate than in other positions. Hence the null hypothesis H_{01} was rejected.

Mean fetal movement among antenatal women assessed at 5 and 15 minutes was ($M = 1.08$, $SD = 1.09$) and ($M = 1.91$, $SD = 1.95$) in supine position , ($M = 2.11$, $SD = 2.29$) and ($M = 3.11$, $SD = 3.62$) in left lateral position and ($M = 2.13$, $SD = 2.12$) , ($M = 2.96$, $SD = 3.07$) in semi fowlers position respectively. It reveals that antenatal

women in left lateral position had highest mean fetal movement than in other positions. Hence the null hypothesis H_{01} was rejected.

The above data shows that mean fetal reactivity among antenatal women assessed at 5 and 15 minutes was ($M = 1.23$, $SD = 0.74$) and ($M = 1.73$, $SD = 1.05$) in supine position, ($M = 1.6$, $SD = 1.05$) and ($M = 2.51$, $SD = 1.30$) in left lateral position and ($M = 1.35$, $SD = 0.81$) , ($M = 2.55$, $SD = 1.41$) in semi fowlers position respectively. It proves that antenatal women in left lateral position had highest mean fetal reactivity. Hence the null hypothesis H_{01} was rejected.

Figure. 7 shows that among antenatal women assessed at 5 and 15 minutes, the mean fetal heart rate of them was between 134.5 to 133.9 betas/min in supine position, 143.06 to 143.2 beats /min in left lateral position and 143.2 to 142.6 beats / min in semi fowlers position. Antenatal women in left lateral position had higher mean fetal heart rate.

Figure. 8 reveals that mean fetal movement among antenatal women assessed at 5 and 15 minutes was between 1.08 to 1.91 in supine position, 2.11 to 3.11 in left lateral position and 2.13 to 2.96 in semi fowlers position. It reveals that antenatal women in left lateral position had highest mean fetal movement than in other positions.

Figure. 9 infers that mean fetal reactivity among antenatal women assessed at 5 and 15 min was between 1.23 to 1.73 in supine position, 1.6 to 2.51 in left lateral position and 1.35 to 2.55 in semi fowlers position. It proves that antenatal women in left lateral position had highest mean fetal reactivity.

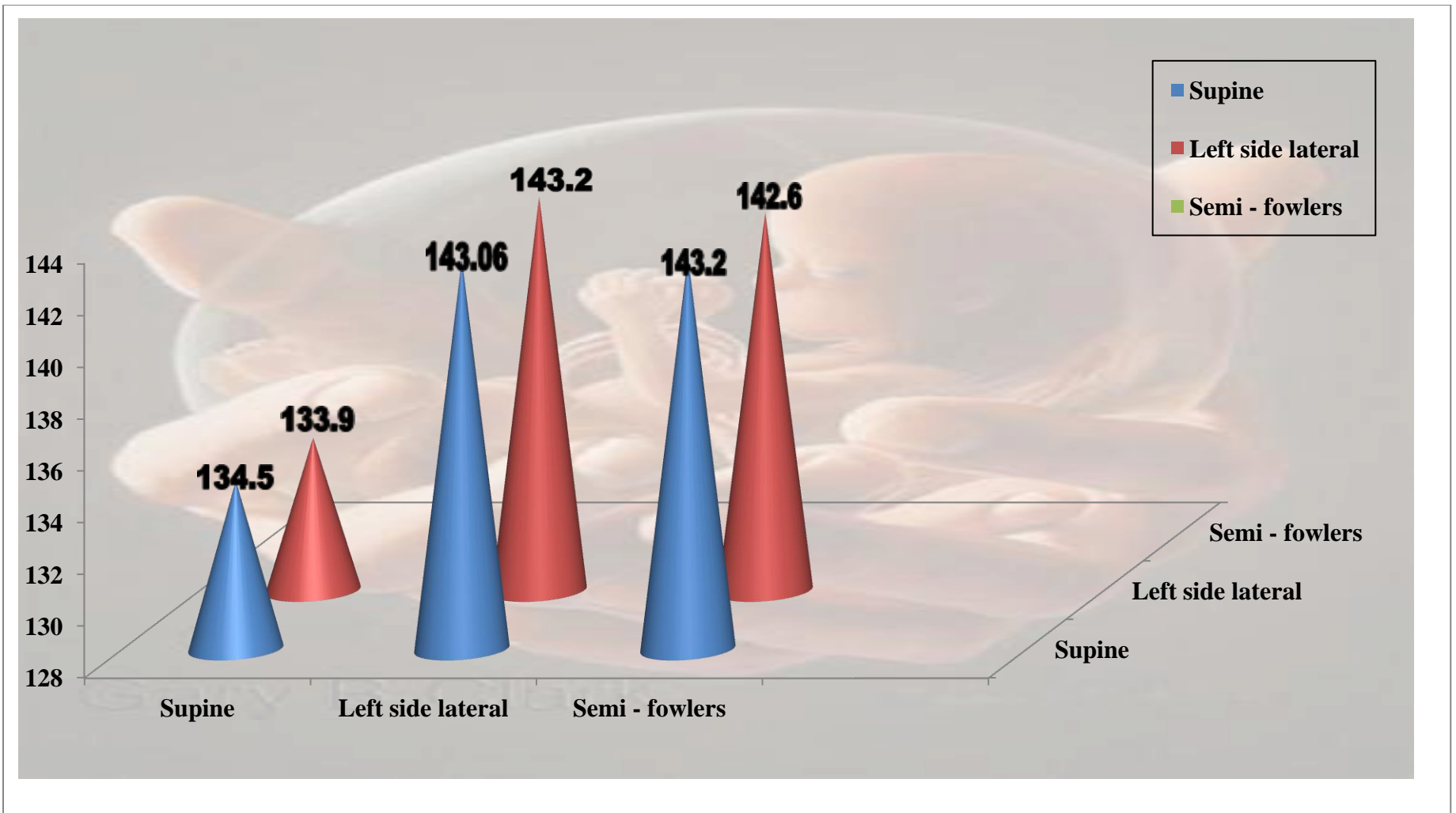


Fig. 7 Comparison of mean fetal heart rate of antenatal women between supine, left lateral and semi fowlers position

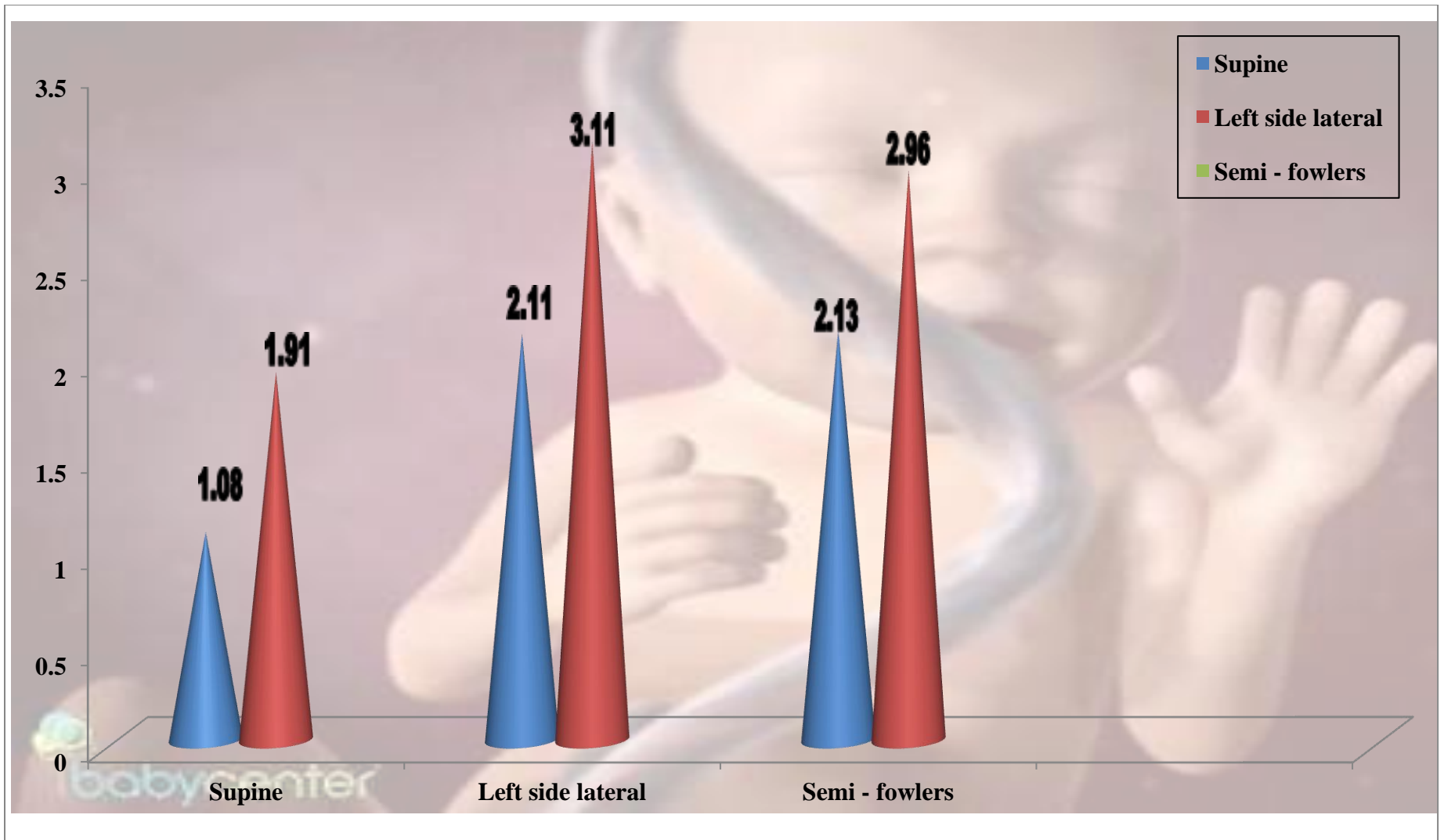


Fig. 8 Comparison of mean fetal movement of antenatal women in supine, left lateral and semi fowlers position

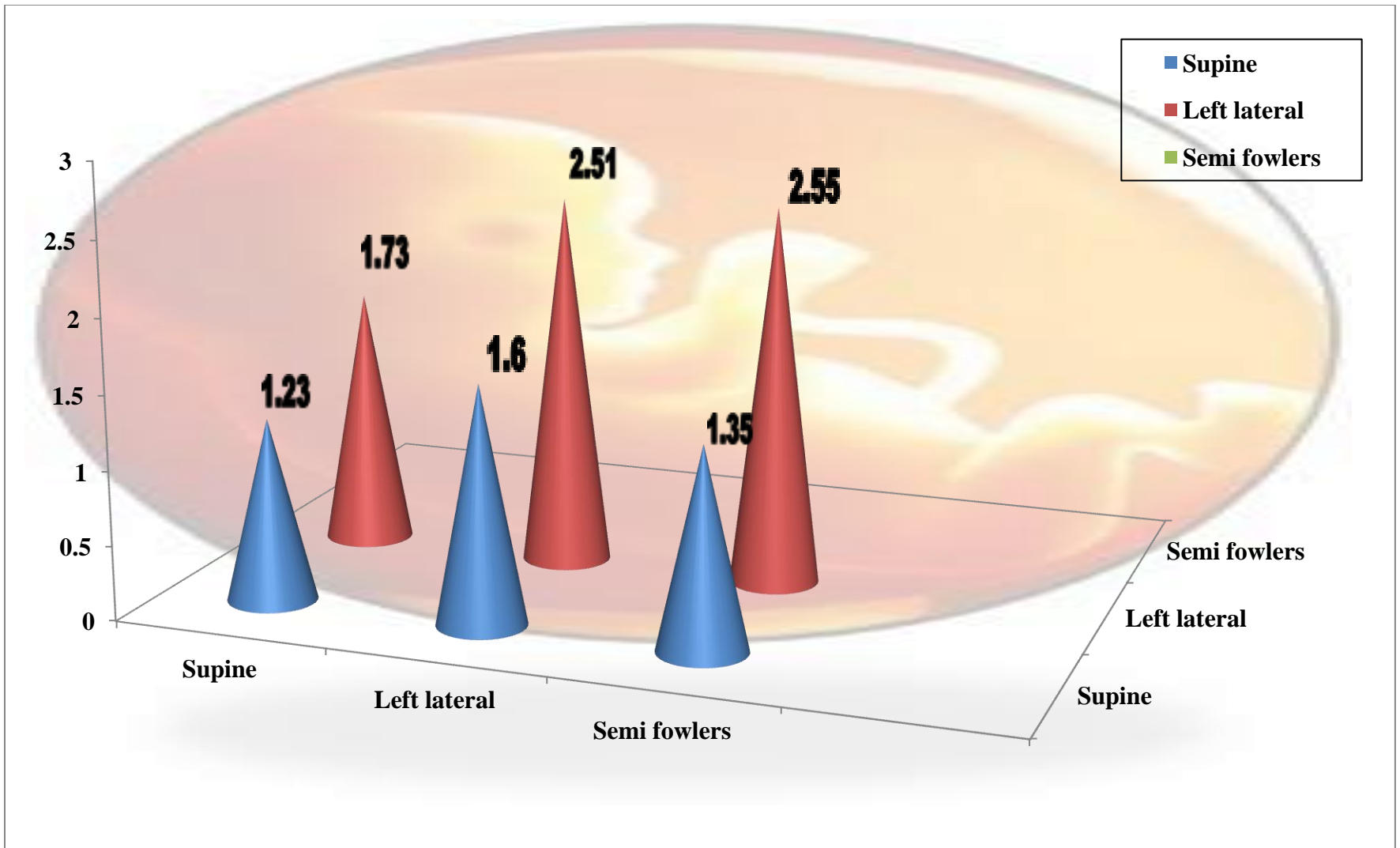


Fig. 9 Comparison of mean fetal reactivity of antenatal women in supine, left side lateral and semi fowlers position

Table 4

Association between selected Demographic and Obstetrical Variable with the Fetal Heart Rate in Supine Position

(N = 60)

Sample characteristics	Fetal heart rate		χ^2
	Upto mean	Above mean	
Age in years			
16 – 25	20	14	0.95
≥ 26	12	14	(df = 1)
Education			
Secondary education	10	6	0.70
Higher secondary and above	22	22	(df = 1)
Religion			
Hindu	26	23	0.007
Others	6	5	(df = 1)
Type of family			
Nuclear	17	19	1.35
Joint	55	9	(df = 1)
Family income per month in rupees			
5000	16	6	5.24*
>5000	16	22	(df = 1)

Residential area			
Rural	4	2	0.64
Urban	28	26	(df = 1)
Height in cms			
160	17	17	0.35
≥161	15	11	(df = 1)
Weight in kg			
60	8	8	0.097
≥61	24	20	(df = 1)
Gravida			
Primigravida	20	21	1.07
Multigravida	12	7	(df = 1)
Gestational age in weeks			
34	6	8	0.80
≥35	26	20	(df = 1)
Any complication during antenatal period			
Anemia	26	25	1.37
Pregnancy induced hypertension	4	2	(df = 2)
Gestational diabetes mellitus	0	0	
No complication	2	1	

Previous obstetrical history			
Abortion	10	5	0.79
Stillbirth	0	0	(df = 2)
Congenital anomaly	0	0	
No complication	22	23	

* P < 0.05

From the table 4, it could be inferred that there was a significant association between family income per month in rupees of antenatal women and fetal heart rate in supine position and no association was found between other demographic and obstetrical variables namely age in years, educational status, religion, occupation, type of family, family income per month in rupees, residential area, nature of work, place of work, diet, personal habits, height in cms, weight in kg, gravida, parity, antenatal check up, gestational age in weeks, complication during antenatal period, previous obstetrical history and fetal heart rate in supine position at the level of confidence $P < 0.05$, hence hypothesis H_{02} and H_{03} was rejected with regard to family income.

Table 5

Association between selected Demographic and Obstetrical Variable with the Fetal Heart Rate in Left Lateral Position

(N = 60)

Sample characteristics	Fetal heart rate		χ^2
	Upto mean	Above mean	
Age in years			
16 - 25	3	31	0.12
≥ 26	3	23	(df = 1)
Education			
Secondary education	1	15	0.34
Higher secondary and above	5	39	(df = 1)
Religion			
Hindu	4	45	1.001
Others	2	9	(df = 1)
Type of family			
Nuclear	4	32	0.12
Joint	2	22	(df = 1)
Family income per month in rupees			
5000	3	19	0.51
>5000	3	35	(df = 1)

Residential area			
Rural	1	5	0.32
Urban	5	49	(df = 1)
Height in cms			
160	5	29	1.93
≥161	1	25	(df = 1)
Weight in kg			
60	3	13	1.85
≥61	3	41	(df = 1)
Gravida			
Primigravida	3	38	1.03
Multigravida	3	16	(df = 1)
Gestational age in weeks			
34	3	11	2.65
≥35	3	43	(df = 1)
Any complication during antenatal period			
Anemia	6	45	4.56*
Pregnancy induced hypertension	0	6	(df =2)
Gestational diabetes mellitus	0	0	
No complication	0	3	

Previous obstetrical history			
Abortion	2	13	0.27
Stillbirth	0	0	(df =2)
Congenital anomaly	0	0	
No complication	4	41	

* P < 0.05

The table 5 shows that there was a significant association between complication during antenatal period of antenatal women and fetal heart rate in left lateral position and no association was found between other demographic and obstetrical variables namely age in years, educational status, religion, occupation, type of family, family income per month in rupees, residential area, nature of work, place of work, diet, personal habits, height in cms, weight in kg, gravida, parity, antenatal checkup, gestational age in weeks, complication during antenatal period, previous obstetrical history and fetal heart rate in left lateral position at the level of confidence $P < 0.05$ hence hypothesis H_{02} and H_{03} was rejected with regard to complication during antenatal period.

Table 6

Association between selected Demographic and Obstetrical Variable with the Fetal Heart Rate in Semi Fowlers Position Position

(N = 60)

Sample characteristics	Fetal heart rate		χ^2
	Upto mean	Above mean	
Age in years			
16 - 25	4	30	2.26
≥ 26	7	19	(df = 1)
Education			
Secondary education	2	14	0.49
Higher secondary and above	9	35	(df = 1)
Religion			
Hindu	8	41	0.71
others	3	8	(df = 1)
Type of family			
Nuclear	8	28	0.90
Joint	3	21	(df = 1)
Family income per month in rupees			
5000	4	18	0.0005
>5000	7	31	(df = 1)

Residential area			
Rural	1	5	0.012
Urban	10	44	(df = 1)
Height in cms			
160	8	26	1.41
≥161	3	23	(df = 1)
Weight in kg			
60	3	13	1.01
≥61	8	36	(df = 1)
Gravida			
Primigravida	7	34	0.13
Multigravida	4	15	(df = 1)
Gestational age in weeks			
34	3	11	0.11
≥35	8	38	(df = 1)
Any complication during antenatal period			
Anemia	11	40	4.64*
Pregnancy induced hypertension	0	6	(df = 2)
Gestational diabetes mellitus	0	0	
No complication	0	3	

Previous obstetrical history			
Abortion	4	11	0.82
Stillbirth	0	0	(df = 2)
Congenital anomaly	0	0	
No complication	7	38	

* $P < 0.05$

Table 6 reveals that there was a significant association between complication during antenatal period of antenatal women and fetal heart rate in semi fowlers position and no association was found between other demographic and obstetrical variables namely age in years, educational status, religion, occupation, type of family, family income per month in rupees, residential area, nature of work, place of work, diet, personal habits, height in cms, weight in kg , gravida, parity, antenatal checkup, gestational age in weeks, complication during antenatal period, previous obstetrical history and fetal heart rate in semi fowlers position at the level of confidence $P < 0.05$, hence hypothesis H_{02} and H_{03} was rejected with regard to complication during antenatal period.

Table 7**Association between selected Demographic and Obstetrical Variable with the Fetal Movement in Supine Position****(N = 60)**

Sample characteristics	Fetal movement		χ^2
	Upto mean	Above mean	
Age			
16 - 25	28	6	0.43
≥ 26	23	3	(df = 1)
Education			
Secondary education	15	1	1.31
Higher secondary and above	36	8	(df = 1)
Religion			
Hindu	40	9	2.37
others	11	0	(df = 1)
Type of family			
Nuclear	30	6	0.19
Joint	21	3	(df = 1)
Family income per month in rupees			
5000	18	4	0.27
>5000	33	5	(df = 1)

Residential area			
Rural	5	1	0.014
Urban	46	8	(df = 1)
Height in cms			
160	29	5	0.05
≥161	22	4	(df = 1)
Weight in kg			
60	15	1	1.31
≥61	36	8	(df = 1)
Gravida			
Primigravida	33	8	2.06
Multigravida	18	1	(df = 1)
Gestational age in weeks			
34	11	3	0.59
≥35	40	6	(df = 1)
Any complication during antenatal period			
Anemia	42	9	0.59
Pregnancy induced hypertension	6	0	(df = 2)
Gestational diabetes mellitus	0	0	
No complication	3	0	

Previous obstetrical history			
Abortion	14	1	1.56
Stillbirth	0	0	(df = 2)
Congenital anomaly	0	0	
No complication	37	8	

From the table 7, it could be inferred that there was no significant association between selected demographic and obstetrical variables namely age in years, educational status, religion, occupation, type of family, family income per month in rupees, residential area, nature of work, place of work, diet, personal habits, height in cms, weight in kg, gravida, parity, antenatal check up, gestational age in weeks, complication during antenatal period, previous obstetrical history and fetal movement in supine position at the level of confidence at $P < 0.05$, hence hypothesis H_{02} and H_{03} was retained.

Table 8

Association between selected Demographic and Obstetrical Variable with the Fetal Movement in Left Lateral Position

(N = 60)

Sample characteristics	Fetal movement		χ^2
	Upto mean	Above mean	
Age in years			
16 - 25	24	10	0.04
≥ 26	19	7	(df = 1)
Education			
Secondary education	12	4	0.01
Higher secondary and above	31	13	(df = 1)
Religion			
Hindu	36	13	0.42
others	7	4	(df = 1)
Type of family			
Nuclear	27	9	0.49
Joint	16	8	(df = 1)
Family income per month in rupees			
5000	14	8	1.10
>5000	29	9	(df = 1)

Residential area			
Rural	4	2	0.001
Urban	29	15	(df = 1)
Height in cms			
160	22	12	1.87
≥161	21	5	(df = 1)
Weight in kg			
60	11	5	0.09
≥61	32	12	(df = 1)
Gravida			
Primigravida	29	12	0.05
Multigravida	14	5	(df = 1)
Gestational age in weeks			
34	9	5	2.94
≥35	34	12	(df = 1)
Any complication during antenatal period			
Anemia	38	13	2.4
Pregnancy induced hypertension	4	2	(df = 2)
Gestational diabetes mellitus	0	0	
No complication	1	2	

Previous obstetrical history			
Abortion	9	6	1.26
Stillbirth	0	0	(df = 2)
Congenital anomaly	0	0	
No complication	34	11	

Table 8 shows that there was no significant association between selected demographic and obstetrical variables namely age in years, educational status, religion, occupation, type of family, family income per month in rupees, residential area, nature of work, place of work, diet, personal habits, height in cms, weight in kg, gravida, parity, antenatal checkup, gestational age in weeks, complication during antenatal period, previous obstetrical history and fetal movement in left lateral position at the level of confidence $P < 0.05$, hence hypothesis H_{02} and H_{03} was retained.

Table 9

Association between selected Demographic and Obstetrical Variable with the Fetal Movement in Semi Fowlers Position

(N = 60)

Sample characteristics	Fetal movement		χ^2
	Upto mean	Above mean	
Age			
16 - 25	23	11	0.03
≥ 26	17	9	(df = 1)
Education			
Secondary education	8	8	2.72
Higher secondary and above	32	12	(df = 1)
Religion			
Hindu	31	18	1.39
others	9	2	(df = 1)
Type of family			
Nuclear	25	11	0.31
Joint	15	9	(df = 1)
Family income per month in rupees			
5000	15	7	0.03
>5000	25	13	(df = 1)

Residential area			
Rural	4	2	0
Urban	36	18	(df = 1)
Height in cms			
160	21	13	0.84
≥161	19	7	(df = 1)
Weight in kg			
60	10	6	0.17
≥61	30	14	(df = 1)
Gravida			
Primigravida	28	13	0.15
Multigravida	12	7	(df = 1)
Gestational age in weeks			
34	7	7	2.28
≥35	33	13	(df = 1)
Any complication during antenatal period			
Anemia	35	16	1.18
Pregnancy induced hypertension	3	3	(df = 2)
Gestational diabetes mellitus	0	0	
No complication	2	1	

Previous obstetrical history			
Abortion	8	7	1.29
Stillbirth	0	0	(df = 2)
Congenital anomaly	0	0	
No complication	32	13	

Table 9 reveals that there was no significant association between selected demographic and obstetrical variables namely age in years, educational status, religion, occupation, type of family, family income per month in rupees, residential area, nature of work, place of work, diet, personal habits, height in cms, weight in kg, gravida, parity, antenatal check up, gestational age in weeks, complication during antenatal period, previous obstetrical history and fetal movement in semi fowlers position at the level of confidence $P < 0.05$, hence hypothesis H_{02} and H_{03} was retained.

Table 10

Association between selected Demographic and Obstetrical Variable with the Fetal Reactivity in Supine Position

(N = 60)

Sample characteristics	Fetal reactivity		χ^2
	Upto mean	Above mean	
Age			
16 - 25	27	7	0.05
≥ 26	20	6	(df = 1)
Education			
Secondary education	14	2	1.08
Higher secondary and above	33	11	(df = 1)
Religion			
Hindu	39	10	0.24
others	8	3	(df = 1)
Type of family			
Nuclear	28	8	0.01
Joint	19	5	(df = 1)
Family income per month in rupees			
5000	20	2	3.23
>5000	27	11	(df = 1)

Residential area			
Rural	4	2	0.53
Urban	43	11	(df = 1)
Height in cms			
160	28	6	0.74
≥161	19	7	(df = 1)
Weight in kg			
60	13	3	0.10
≥61	34	10	(df = 1)
Gravida			
Primigravida	31	10	2.03
Multigravida	16	3	(df = 1)
Gestational age in weeks			
34	10	4	0.51
≥35	37	9	(df = 1)
Any complication during antenatal period			
Anemia			
Pregnancy induced hypertension	39	12	6.41*
Gestational diabetes hypertension	6	0	(df = 2)
No complication	0	0	
	2	1	

Previous obstetrical history			
Abortion	14	1	3.1
Stillbirth	0	0	(df = 2)
Congenital anomaly	0	0	
No complication	33	12	

* $P < 0.05$

From the table 10, it could inferred that there was a significant association between complication during antenatal period of antenatal women and fetal reactivity in supine position and no association between other demographic and obstetrical variables namely age in years, educational status, religion, occupation, type of family, family income per month in rupees, residential area, nature of work, place of work, diet, personal habits, height in cms, weight in kg, gravida, parity, antenatal checkup, gestational age in weeks, complication during antenatal period, previous obstetrical history and fetal reactivity in supine position at the level of confidence $P < 0.05$, hence hypothesis H_{02} was retained and H_{03} was rejected with regard to complication during antenatal period.

Table 11

Association between selected Demographic and Obstetrical Variable with the Fetal Reactivity in Left Lateral Position

(N = 60)

Sample characteristics	Fetal reactivity		χ^2
	Upto mean	Above mean	
Age in years			
16 - 25	17	17	0.79
≥ 26	16	10	(df = 1)
Education			
Secondary education	8	8	0.22
Higher secondary and above	25	19	(df = 1)
Religion			
Hindu	27	22	0.001
others	6	5	(df = 1)
Type of family			
Nuclear	19	17	0.17
Joint	14	10	(df = 1)
Family income per month in rupees			
5000	10	12	1.27
>5000	23	15	(df = 1)

Residential area			
Rural	2	4	1.26
Urban	31	23	(df = 1)
Height in cms			
160	20	14	0.46
≥161	13	13	(df = 1)
Weight in kg			
60	8	8	0.22
≥61	25	19	(df = 1)
Gravida			
Primigravida	23	18	0.06
Multigravida	10	9	(df = 1)
Gestational age in weeks			
34	9	5	0.63
≥35	24	22	(df = 1)
Any complication during antenatal period			
Anemia	29	22	3.12
Pregnancy induced hypertension	2	4	(df = 2)
Gestational diabetes mellitus	0	0	
No complication	2	1	

Previous obstetrical history			
Abortion	7	8	0.62
Stillbirth	0	0	(df =2)
Congenital anomaly	0	0	
No complication	26	19	

* P < 0.05

Table 11 shows that there was no significant association between selected demographic and obstetrical variable namely age in years, educational status, religion, occupation, type of family, family income per month in rupees, residential area, nature of work, place of work, diet, personal habits, height in cms, weight in kg, gravida, parity, antenatal check up, gestational age in weeks, complication during antenatal period, previous obstetrical history of antenatal women and fetal reactivity in left lateral position at the level of confidence $P < 0.05$, hence hypothesis H_{02} and H_{03} was retained.

Table 12

Association between selected Demographic and Obstetrical Variable with the Fetal Reactivity in Semi Fowlers Position

(N = 60)

Sample characteristics	Fetal reactivity		χ^2
	Upto mean	Above mean	
Age in years			
16 - 25	25	9	1.66
≥ 26	15	11	(df = 1)
Education			
Secondary education	11	5	0.04
Higher secondary and above	29	15	(df = 1)
Religion			
Hindu	32	17	0.22
others	8	3	(df = 1)
Type of family			
Nuclear	20	16	5*
Joint	20	4	(df = 1)
Family income per month in rupees			
5000	16	6	0.57
>5000	24	14	(df = 1)

Residential area			
Rural	4	2	0
Urban	36	18	(df = 1)
Height in cms			
160	23	11	0.03
≥161	17	9	(df = 1)
Weight in kg			
60	12	4	0.68
≥61	28	16	(df = 1)
Gravida			
Primigravida	29	12	0.96
Multigravida	11	8	(df = 1)
Gestational age in weeks			
34	7	7	2.28
≥35	33	13	(df = 1)
Any complication during antenatal period			
Anemia	33	18	1.62
Pregnancy induced hypertension	5	1	(df = 2)
Gestational diabetes mellitus	0	0	
No complication	2	1	

Previous obstetrical history			
Abortion	8	7	1.55
Stillbirth	0	0	(df = 2)
Congenital anomaly	0	0	
No complication	32	13	

* P < 0.05

From the table 12, it could be inferred that there was a significant association between type of family and fetal reactivity in semi fowlers position and no any significant association between selected demographic and obstetrical variable namely age in years, educational status, religion, occupation, type of family, family income per month in rupees, residential area, nature of work, place of work, diet, personal habits, height in cms, weight in kg, gravida, parity, antenatal checkup, gestational age in weeks, complication during antenatal period, previous obstetrical history of antenatal women of antenatal women and fetal reactivity in semi fowlers position at the level of confidence $P < 0.05$, hence hypothesis H_{02} was rejected with regard to type of family and H_{03} was retained.

Table 13**Repeated Measure of Analysis of Variance of Mean Fetal Heart Rate, Mean Fetal Movement and Mean Fetal Reactivity between Position****(N = 60)**

Variables	Observation	ANOVA	Sum of Square	Mean Square	F value
Fetal heart rate	5 min	Between sample	10610196.2	53050981.1	-53.1*
		Within sample	-17674027.6	-99853.2	
	15 min	Between sample	10555333.06	5277666.5	-53.1*
		Within sample	-17583310.26	-99340.7	
Fetal movement	5min	Between sample	1038.8	519.4	-62.8*
		Within sample	-1465.4	-8.27	
	15 min	Between sample	2253.2	1126.6	-62.9*
		Within sample	-3175.2	-17.9	
Fetal reactivity	5 min	Between sample	911.1	455.5	-54.9*
		Within sample	-1468.1	-8.29	
	15 min	Between sample	2485.7	1242.8	-54.7*
		Within sample	-4021.1	-22.7	

* P < 0.05

Table 13 The above data shows that repeated measure of analysis of variance of mean fetal heart rate assessed at 5 and 15 minutes was (-53.1, -53.1), mean fetal movement was (-62.8, -62.9) and mean fetal reactivity was (-54.9, -54.7). This revealed that the result of analysis of variance of non stress test parameters among antenatal women between three positions varied significantly. This finding was not consistent with H_{01} , hence the null hypothesis H_{01} was rejected.

Table 14

Frequency and Percentage Distribution of Level of satisfaction of Nurse who cared for Antenatal Women

(N = 6)

Level of satisfaction	Position					
	Supine		Left side lateral		Semi fowlers	
	f	p	f	p	f	p
Highly satisfied	-	-	6	100	4	66.7
Satisfied	5	83.3	-	-	2	33.3
Dissatisfied	1	16.7	-	-	-	-
Highly dissatisfied	-	-	-	-	-	-

The data from the table 14 reveals that all the nurses were highly satisfied (100 %) with left lateral position and none of them reported dissatisfaction towards the position.

Summary

This chapter dealt with the analysis and the interpretation of the data collected by the researcher. From the analysis it can be inferred that the left lateral position was the best position and the most comfortable position for fetal heart rate, fetal movement and fetal reactivity.

CHAPTER V

DISCUSSION

Statement of the Problem

A Pre Experimental Study to assess the Effect of Selected Maternal Positions upon Non Stress Test Parameters among Antenatal Women at Selected Hospital, Chennai.

Objectives of the Study

The objectives of the study are

1. To determine the effectiveness of positions upon non stress test parameters among antenatal women.
2. To compare the effectiveness of various positions upon non stress test parameters among antenatal women.
3. To find out the association between the selected demographic variables and non stress test parameters in various positions among antenatal women.
4. To find out the association between the selected obstetrical variables and non stress test parameters in various positions among antenatal women.
5. To assess the level of satisfaction of the nurses regarding effect of positions upon the non stress test parameters among antenatal women.

This study was carried out for 60 antenatal women at St.Antony's Hospital. The effectiveness of positions (supine, left lateral and semi fowlers position) upon non stress test parameters was assessed among antenatal women. After making the antenatal women

comfortable the experiment started with the antenatal women in supine position for 20 minutes followed by left lateral position for 20 minutes followed by semi fowlers position for 20 minutes. During each position non stress test parameters (fetal heart rate, fetal movement and fetal reactivity) was recorded at 5 and 15 minutes interval when the antenatal women came to outpatient department. The effectiveness of each positions upon non stress test parameters was computed. Finally the level of satisfaction upon selected positions during non stress test was assessed for the nurses who cared for antenatal women.

The discussion is presented under the following headings:

- Demographic and obstetrical variable of the antenatal women.
- Mean and standard deviation of non stress test parameter of antenatal women in supine, left lateral and semi fowlers position.
- Association between selected demographic and obstetrical variable with the fetal heart rate, fetal movement and fetal reactivity in supine, left lateral and semi fowlers position.
- Repeated measure of analysis of variance of mean fetal heart rate, mean fetal movement and mean fetal reactivity between position.
- Assessment of level of satisfaction of nurses who cared for antenatal women.

Demographic variables of antenatal women

Among the antenatal women assessed all of them (100%) were housewife, vegetarian, worked in indoor area as moderate workers with no any bad personal habits. Majority of them were Hindus (81.7%), most of them resided in semiurban area (63.3%) and had nuclear family (60%). Significant percentages of the antenatal women were between the age group of 21 - 25 years (45%), were graduates and above (41.7%) with a family income per month between 5001-10,001 rupees (41.6%).

The present study findings is supported by Hoare et al., (2004) who said that low socio-economic status may affect the nutritional status of the pregnant women which in turn influences the growth, physical and mental development of the fetus. Optimising nutritional status before, during and after pregnancy is important. The pregnant woman needs to have sufficient energy and nutrient supply from diet and reserves to maintain her own health as well as for the growing fetus.

The findings of the study has been supported by Sabin (2009) who observed a decreasing trend of fetal deaths with an increase in maternal education, ranging from 46 percent in women who had no schooling to 19 per cent in women who had post graduation. Factors relating to the care of women, environmental hygiene, sanitation, household food security and poverty are all likely to operate simultaneously with a low level of maternal literacy which may directly or indirectly affect fetal outcomes.

Obstetric variables of the antenatal women

In the present study all of the antenatal women (100%) had regular antenatal checkup, majority of them were primipara(73.3%), anemic (85%), with no any previous obstetrical history(75%), most of them had weight between 61-80 kg(66.6%) were primigravida(68.3%) and significant percentage of the antenatal women were in a height of 141 – 160 cm (56.7%) with a gestational age above 37 weeks (41.7%).. The researcher assumes that anemia was common in antenatal women mainly with gestational age above 32 weeks because of increased demand of pregnancy and the growing child.

As they lived in nuclear family in semiurban area the chance of decreased attention could have attributed to less intake of iron rich diet leading to anemia. It is an important responsibility for nurses to identify mothers who are at risk of anemia during antenatal visits and educate them on importance of iron rich food.

Mean and Standard Deviation of Non Stress Test Parameters of Antenatal Women in Supine, Left Lateral and Semi Fowlers Position

Among the antenatal women assessed at 5 and 15 minutes the mean fetal heart rate was ($M = 134.5$, $SD = 12.5$) and ($M = 133.9$, $SD = 11.8$), the mean fetal heart rate of them was between 134.5 to 133.9 beats/minute in supine position, similarly in left lateral position, mean fetal heart rate at 5 minutes and 15 minutes was ($M = 143.06$, $SD = 8.53$) and ($M = 143.2$, $SD = 8.37$), so the mean fetal heart rate in left lateral position was between 143.06 to 143.2 beats /minute. In semi fowlers position the mean fetal heart rate at 5 minutes and 15 minutes was ($M = 143.2$, $SD = 9.12$) and ($M = 142.6$, $SD = 8.96$), so

the mean fetal heart rate was between 143.2 to 142.6 beats / minute in semi fowlers position. It shows that antenatal women in left lateral position had highest mean fetal heart rate than in other positions respectively.

The findings of the study has been supported by Luisi (2005)where the authors have described that hemodynamic changes can occur in women who are in semi fowlers position without a left lateral tilt. So the investigators clinically suggested that lateral tilting of gravidas in semi fowlers position during non stress test is supported to avoid hypotensive symptoms.

Mean fetal movement among antenatal women assessed at 5 and 15 minutes was (M = 1.08 , SD = 1.09) and (M = 1.91 , SD = 1.95) in supine position , (M = 2.11 , SD = 2.29) and (M = 3.11 ,SD = 3.62) in left lateral position and (M = 2.13, SD = 2.12) , (M = 2.96, SD = 3.07) in semi fowlers position respectively. It reveals that antenatal women in left lateral position had highest mean fetal movement than in other positions.

The finding of the study has been supported by Clin (2007) where the authors suggested that supine position yields the lowest fetal movement. Relevance to clinical practice sitting up, semi fowler's and left lateral positions are recommended to be used during the non stress test. In addition, the preferences of the pregnant women should also be determined before the test in order to minimize the discomfort.

The mean fetal reactivity among antenatal women assessed at 5 and 15 minutes was (M = 1.23 , SD = 0.74) and (M = 1.73 , SD = 1.05) in supine position, (M = 1.6 , SD = 1.05) and (M = 2.51 ,SD = 1.30) in left lateral position and (M = 1.35, SD = 0.81) ,

(M = 2.55, SD = 1.41) in semi fowlers position respectively. It proves that antenatal women in left lateral position had highest mean fetal reactivity.

The present study was supported by Baker (2004) where they have described that group of patients with a supine non reactive test demonstrated an associated compression of abdominal aorta by the pregnant uterus but not in lateral position. Through self experience it is found that in most of the hospitals supine position is carried out for doing non stress test and in some patient the result is non reactive in supine position but when position is changed to left lateral the result shows reactive.

Association between the selected Demographic Variables and Non Stress Test Parameters in Various Positions among Antenatal Women

A significant association was found between family income per month in rupees ($\chi^2 = 5.24$, df = 1) and fetal heart rate in supine position and also between type of family ($\chi^2 = 5$, df = 1) and fetal reactivity in semi fowlers position and no association was found between other demographic and obstetrical variables. The finding of the study has been supported by Cito (2006) who examined the effect of socio-economic status and maternal literacy on birth weight and fetal biophysical profile. He concluded the study with showing that maternal illiteracy and low socio-economic status have been shown to be major risk factors for developing baby.

Association between the selected Obstetrical Variables and Non Stress Test Parameters in Various Positions among Antenatal Women

A significant association was found between complication during antenatal period of antenatal women ($\chi^2 = 4.56$, $df = 2$), ($\chi^2 = 4.64$, $df = 2$) and fetal heart rate in left lateral and semi fowlers position and with fetal reactivity ($\chi^2 = 6.41$, $df = 2$) in supine position. The findings of the study has been supported by Swansburg(2005) who concluded that maternal cardiac measures in the preeclamptic group had a decreased parasympathetic nervous system when standing compared to lying. Fetus in the normotensive compared to the preeclamptic group had more spontaneous fetal heart rate accelerations, the greater the decrease in the parasympathetic nervous system indicator from lying to standing, the greater the number of fetal heart rate accelerations.

The authors also explained that alcohol intake, smoking, certain medications, fetus sleep cycle as well as improper placement of equipment during monitor can contribute to inaccurate results.

Repeated Measure of Analysis of Variance of Mean Fetal Heart Rate, Mean Fetal Movement and Mean Fetal Reactivity between Position

Repeated measure of analysis of variance of mean fetal heart rate assessed at 5 and 15 minutes was (-53.1, -53.1), mean fetal movement was (-62.8, -62.9) and mean fetal reactivity was (-54.9, -54.7). This revealed that the result of analysis of variance of non stress test parameters among antenatal women between three positions varied significantly.

The finding of the study has been supported by Calonaci (2000), where he randomly assigned pregnant mothers to a sitting first (semi fowler position) or supine first (left lateral recumbent position). Ten minutes of fetal heart rate monitoring was performed in each position at each visit. The result shows that there was more non reactivity in the supine position (45.0% vs 34.6% ; $P = .001$). Overall, patients who were examined in the supine position first were 1.8 times more likely ($P < .05$) to have a change from a non reactive to reactive result when the position was switched after 10 minutes than those who were examined sitting first. They concluded that semi fowler's position is a superior position for conducting a non stress test in a short period. Use of this position could decrease the need for prolonged monitoring, thus leading to a more time effective evaluation of fetal risk. The outcomes were similar when the left tilt group was compared with semi fowlers position. Lateral tilting of gravidas in semi fowler's position during non stress testing is thus supported to avoid hypotension syndrome.

Level of Satisfaction of Nurse who cared for Antenatal Women

The study findings revealed that all the nurses were highly satisfied (100 %) with left lateral position and none of them reported dissatisfaction towards the position. The findings of the study has been supported by Poje (2007)who revealed that the most appropriate position of antenatal women during non stress test is in left lateral position. In certain cases where the antenatal woman was not responding in left lateral position gave better results when placed in semi fowlers position. It was found that most of the antenatal women faced difficulty to lie down in supine position as it caused minor ailments like

breathing discomfort, back pain etc to them. The present study was supported by Cleaver (2011) where the authors described that supine position showed least fetal reactivity, increased maternal back pain as well as maternal shortness of breath.

Summary

This chapter has dealt with the discussion of various aspects of the study findings. This emphasized on the demographic and obstetrical variables of antenatal women, effectiveness of positions upon non stress test parameters, association between selected demographic and obstetrical variable with the fetal heart rate, fetal movement and fetal reactivity in supine, left lateral and semi fowlers position, level of satisfaction of nurses, repeated measures of non stress test parameters between the positions with the help of an extensive review of literature.

CHAPTER VI
SUMMARY, CONCLUSION, IMPLICATIONS, RECOMMENDATIONS AND
LIMITATIONS

The heart of the research project has in reporting the findings. This is the most creative part of the study. This chapter deals with summary of these study findings, conclusions, implications and recommendations.

Summary

This study was conducted by the researcher to find the effectiveness of selected maternal positions upon non stress test parameters among antenatal women.

The objectives of the study were

1. To determine the effectiveness of positions upon non stress test parameters among antenatal women.
2. To compare the effectiveness of various positions upon non stress test parameters among antenatal women.
3. To find out the association between the selected demographic variables and non stress test parameters in various positions among antenatal women.
4. To find out the association between the selected obstetrical variables and non stress test parameters in various positions among antenatal women.
5. To assess the level of satisfaction of the nurses regarding effect of positions upon the non stress test parameters in antenatal women.

Null Hypotheses

H₀₁ – There will be no significant difference in non stress test parameters between the positions.

H₀₂ – There will be no significant association between the selected demographic variables and non stress test parameters in selected positions of antenatal women.

H₀₃ – There will be no significant association between the selected obstetrical variables and non stress test parameters in selected positions of antenatal women.

The Major Findings of the Study

Demographic variables of the antenatal women

Among the antenatal women assessed all of them (100%) were housewife, vegetarian, worked in indoor area as moderate workers with no any bad personal habits. Majority of them were Hindus (81.7%), most of them resided in semiurban area (63.3%) and had nuclear family (60%). Significant percentages of the antenatal women were between the age group of 21 - 25 years (45%) with a family income per month between 5001-10,001 rupees (41.6%). This shows that low socio- economic status and maternal education may affect the nutritional status of the pregnant women which in turn influences the growth, physical and mental development of the fetus.

Obstetric variables of the antenatal women

In the present study all of the antenatal women (100%) had regular antenatal checkup, majority of them were primipara (73.3%) with no any previous obstetrical history(75%), most of them had weight between 61-80 kg (66.6%) were primigravida (68.3%) and significant percentage of the antenatal women were in a height of 141 – 160 cm (56.7%). Thus the researcher assumes that anemia was common in antenatal women mainly with gestational age above 32 weeks because of increased demand of pregnancy and the growing child. It has also been interpreted that area of residence may also cause decreased attention towards health leading to decreased intake of iron rich diet which may complicate the stage upto anemia. Thus it is an important responsibility for nurses to identify mothers who are at risk of anemia during antenatal visits and educate them on importance of iron rich food.

Mean and Standard Deviation of Non Stress Test Parameters of Antenatal Women in Supine, Left Lateral and Semi Fowlers Position

Among the antenatal women assessed at 5 and 15 minutes the mean fetal heart rate was (M = 134.5 , SD = 12.5) and (M = 133.9 , SD = 11.8), the mean fetal heart rate of them was between 134.5 to 133.9 beats/minute in supine position, similarly in left lateral position, mean fetal heart rate at 5 minutes and 15 minutes was (M = 143.06 ,SD = 8.53) and (M = 143.2 , SD = 8.37), so the mean fetal heart rate in left lateral position was between 143.06 to 143.2 beats /minute. In semi fowlers position the mean fetal heart rate at

5 minutes and 15 minutes was (M = 143.2 , SD = 9.12) and (M = 142.6 , SD = 8.96), so the mean fetal heart rate was between 143.2 to 142.6 beats / minute in semi fowlers position. It shows that antenatal women in left lateral position had highest mean fetal heart rate than in other positions respectively.

Mean fetal movement among antenatal women assessed at 5 and 15 minutes was (M = 1.08 , SD = 1.09) and (M = 1.91 , SD = 1.95) in supine position , (M = 2.11 , SD = 2.29) and (M = 3.11 ,SD = 3.62) in left lateral position and (M = 2.13, SD = 2.12) , (M = 2.96, SD = 3.07) in semi fowlers position respectively. It reveals that antenatal women in left lateral position had highest mean fetal movement than in other positions.

The mean fetal reactivity among antenatal women assessed at 5 and 15 minutes was (M = 1.23 , SD = 0.74) and (M = 1.73 , SD = 1.05) in supine position, (M = 1.6 , SD = 1.05) and (M = 2.51 ,SD = 1.30) in left lateral position and (M = 1.35, SD = 0.81) , (M = 2.55, SD = 1.41) in semi fowlers position respectively. It proves that antenatal women in left lateral position had highest mean fetal reactivity.

Association between the selected Demographic Variables and Non Stress Test Parameters in Various Positions among Antenatal Women

A significant association was found between family income per month in rupees ($\chi^2 = 5.24$, df = 1) and fetal heart rate in supine position and also between type of family ($\chi^2 = 5$, df = 1) and fetal reactivity in semi fowlers position and no association was found between other demographic and obstetrical variables. The finding of the study has been supported by Cito (2006) who examined the effect of socio-economic status and maternal

literacy on birth weight and fetal biophysical profile. He concluded the study with showing that maternal illiteracy and low socio-economic status have been shown to be major risk factors for developing baby.

Association between the Selected Obstetrical Variables and Non Stress Test Parameters in Various Positions among Antenatal Women

A significant association was found between complication during antenatal period of antenatal women ($\chi^2 = 4.56$, $df = 2$), ($\chi^2 = 4.64$, $df = 2$) and fetal heart rate in left lateral and semi fowlers position and with fetal reactivity ($\chi^2 = 6.41$, $df = 2$) in supine position. Thus with the above data it could be inferred that maternal complications during pregnancy can have an impact over fetal heart rate, as the greater the decrease in the parasympathetic nervous system indicator from lying to standing, the greater the number of fetal heart rate accelerations.

Repeated Measure of Analysis of Variance of Mean Fetal Heart Rate, Mean Fetal Movement and Mean Fetal Reactivity between Position

Repeated measure of analysis of variance of mean fetal heart rate assessed at 5 and 15 minutes was (-53.1, -53.1), mean fetal movement was (-62.8, -62.9) and mean fetal reactivity was (-54.9, -54.7). This revealed that the result of analysis of variance of non stress test parameters among antenatal women between three positions varied significantly. Best non stress test parameters were seen in left lateral position with minimal level of discomfort. With this the researcher concludes by showing that lateral tilting of gravidas during non stress testing is supported to avoid hypotension syndrome.

Level of Satisfaction of Nurses who cared for Antenatal Women

The study findings revealed that all the nurses were highly satisfied (100 %) with left lateral position and none of them reported dissatisfaction towards the position.

Conclusion

The findings of the study revealed that the most appropriate position of antenatal women during non stress test is in left lateral position. In certain cases where the antenatal woman was not responding in left lateral position gave better results when placed in semi fowlers position. It was also found that most of the antenatal women faced difficulty to lie down in supine position as it showed least fetal reactivity, increased maternal back pain as well as maternal shortness of breath. So the researcher concluded with the findings that left lateral position should be preferred during non stress test as it shows the best fetal parameter.

Implications

The findings of the study has implications in different branches of nursing profession i.e. nursing practice, nursing education, nursing administration and nursing research. By assessing the effectiveness of positions we get a clear picture regarding different steps to be taken in all these fields, to improve the standards of nursing profession.

Nursing practice

Nurses as team leaders can plan and co-ordinate activities for betterment of antenatal women. They can plan and formulate strategies regarding positioning antenatal

women. It has been demonstrated that supine position can cause compression of abdominal aorta by the pregnant uterus and can cause hypotensive syndrome which could be prevented in lateral position. Through self experience it is found that in most of the hospitals supine position is carried out for doing non stress test and in some patient the result is non reactive in supine position but when position is change to left lateral the result shows reactive. Relevance to clinical practice sitting up, semi fowler's and left lateral positions are recommended to be used during the non stress test. Use of this position could decrease the need for prolonged monitoring, thus leading to a more time effective evaluation of fetal risk.

Nursing education

Integration of theory and practice is a vital need and it is important in nursing education. Care of antenatal women has been included in beginning of years of nursing education. Hence nurse educators can lay emphasis on importance of positioning and its role in health maintenance of antenatal women. While changing health care trends nursing education must emphasize primary health care approach focusing on prevention than care.

Nurse educator need to lay emphasis on positioning of antenatal women during non stress test in the curriculum and the nursing students should be taught about importance of non stress test during high risk pregnancy. Advanced educational technology such as simulation, video assisted teaching could be incorporated for students while teaching positioning during non stress test.

Nursing administration

Technological advances and ever growing challenges place a great demand on health care professionals. Nurse administrators have great responsibilities to provide nurses with substantive continuing education to tackle these challenges and demands. Continuing nursing education programmes enable nurses to update their knowledge and to acquire skill and demonstrate high quality care. This will enable the nurses to update their knowledge and to acquire special skills in practicing care for antenatal women during high risk pregnancy.

Nursing research

There is a need for extensive and intensive research in this area. It is upon a big avenue for research on innovative methods of creating awareness, development of teaching material and setting up of multimedia centers for teaching and for creating awareness among nurses regarding position and it's benefits, health promoting properties and it's availability. Disseminate the findings through conferences, seminars, publications in professional, national, international journals and World Wide Web.

Recommendations

- The same study can be conducted on a large sample to generalize the results.
- A comparison can be made between primipara and multipara.

- A similar study can be conducted by using true experimental design.
- The same study can be conducted in different settings with similar facilities.
- A similar study can be conducted by using cross – over design.

Limitations

- The study findings cannot be generalized due to small sample size.
- Random sampling was not possible due to practical difficulties.
- Quasi experimental study could not be conducted due to practical difficulties.

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APPENDIX I

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY



Apollo College of Nursing

(Recognised by the Indian Nursing Council and Affiliated to
the Tamil Nadu Dr. M.G.R. Medical University, Chennai)

CO/0418/12

27.06.2012

To,

The Administrator
St. Antony's Hospital,
Madhavaram,
Chennai.

Respected Madam,

Sub.: To request permission for research study – Reg.

Greetings! As part of the curriculum requirement our 2nd year M. Sc. (N) student
Ms. Nisha Thomas has selected the following title for her research study.

**“An experimental study to assess the effectiveness of maternal positions upon
nonstress test in antenatal women at selected maternity centres, Chennai.**

So I kindly request your goodselves to permit her to conduct study in your esteemed institution.

Thanking You,

Dr. LATHA VENKATESAN
PRINCIPAL



IS/ISO 9001:2000

Vanagaram to Ambattur Main Road, Ayanambakkam, Chennai - 600 095.
Ph. : 044 - 2653 4387 Tele fax : 044 - 2653 4923 / 044- 2653 4386



St. Antony's Hospital

Madhavaram, Chennai - 600 060

☎ : Off. : 2537 6392
Resi.: 2537 5486

Date : *25-8-2012*

To,

The Principal,
Apollo College of Nursing,
Vanagaram to Ambattur Main Road,
Ayanambakkam,
CHENNAI - 600 095

Dear Sir,

This is to certify that Ms. Nisha Thomas 2nd year M.Sc (N) student specializing in research study had clinical experience in Labour room from 24.6.2012 to 22.7.2012. She was eager to learn and was doing well in the clinical area. I wish her all the best in her future studies.

Thanking you,

Yours faithfully

Dr. Flory

ADMINISTRATOR
ST. ANTONY'S HOSPITAL
Madhavaram, Chennai - 60.
Tamil Nadu

APPENDIX II

ETHICAL COMMITTEE CLEARANCE LETTER

Ethics Committee



30th August 2012

To,

Ms. Nisha Thomas,
2nd Year M.SC (Nursing),
Department of Obstetrics & Gynecology Nursing,
Apollo College of Nursing,
Chennai.

Ref: Effectiveness of selected maternal positions upon non-stress test parameters among antenatal mothers.

Sub: Approval of the above referenced project and its related documents.

Dear Ms. Nisha,

Ethics Committee-Apollo Hospitals has received the following document submitted by you related to the conduct of the above-referenced study.

- Project proposal.
- Participant Consent Form.

The Ethics Committee-Apollo Hospitals reviewed and discussed the study proposal documents submitted by you related to the conduct of the above referenced study at its meeting held on 29th August 2012.

The following Ethics Committee Members were present at the meeting held on 29th August 2012.

Name	Profession	Position in the committee
Mr. S. S. Narayanan	Ethicist	Chairman
Dr. Rema Menon	Clinician	Member Secretary
Dr. Radha Rajagopalan	Clinician	EC-Member
Dr. Krishnakumar	Clinician	EC-Member

Apollo Hospitals Enterprise Limited
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E - Mail : ecapollochennai@gmail.com

Ethics Committee

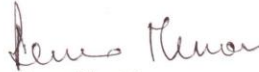
Dr. Vijaya Kumar	Clinician	EC-Member
Dr. Clive Fernandes	Consultant Clinical Pharmacologist	Basic Medical Scientist
Dr. Nalini Roa	Social Worker	EC-Member
Ms. N. Suseela	Retired English Teacher	Layperson
Ms. Maimoona Badsha	Lawyer	Lawyer
Dr. Paul Dilipkumar	Clinician	EC-Member
Dr. V. Balaji	Clinician	EC-Member
Dr. M. A. Raja	Consultant Medical Oncologist	EC-Member

After due ethical and scientific consideration, the Ethics Committee has approved the above presentation submitted by you.

The EC review and approval of the report is only to meet their academic requirement and will not amount to any approval of their conclusions/recommendations as conclusive, deserving adoption and implementation, in any form, in any health care institution.

The Ethics Committee is constituted and works as per ICH-GCP, ICMR and revised Schedule Y guidelines.

With Regards,



Dr. Rema Menon,
Ethics Committee-Member Secretary,
Apollo Hospitals, Chennai,
Tamil Nadu, India.

Dr. REMA MENON
MEMBER SECRETARY
ETHICS COMMITTEE, APOLLO HOSPITALS
APOLLO HOSPITALS ENTERPRISE LIMITED
CHENNAI-600 008, TAMILNADU

Date: 30/08/12

APPENDIX III

LETTER REQUESTING OPINIONS AND SUGGESTIONS OF EXPERTS FOR ESTABLISHING CONTENT VALIDITY OF RESEARCH TOOL

From
Ms. Nisha Thomas
M.Sc(Nursing) Second Year,
Apollo College of Nursing,
Chennai – 600 095.

To

Forwarded Through:
Dr. Latha Venkatesan,
Principal,
Apollo College of Nursing.

Sub: Requesting for opinions and suggestions of experts for establishing content validity for research tool.

Respected Madam,

I am a postgraduate student of the Apollo College of Nursing. I have selected the below mentioned topic for research project to be submitted to The Tamil Nadu Dr. M.G.R Medical University, Chennai as a partial fulfillment of Masters of Nursing Degree.

TITLE OF THE TOPIC:

A pre experimental study to assess the effect of selected maternal positions upon non stress test parameters among antenatal women at selected hospitals, Chennai.

With regards may I kindly request you to validate my tool for its appropriateness and relevancy. I am enclosing the Background, Need for the study, Statement of the problem, Objectives of the study, Demographic Variable Proforma, Obstetrical Variable Proforma, Observational Checklist for Non Stress Test Parameters and Rating Scale on the Level of Satisfaction of Nurses regarding Positions on Non Stress Test Parameters. I would be highly obliged and remain thankful for your great help if you could validate and send it as soon as possible.

Thanking you,

Date:

Yours sincerely,

Place:

(Nisha Thomas)

APPENDIX IV
LIST OF EXPERTS

- 1. Dr. Latha Venkatesan, M.Sc(N)., M.phil (N)., Ph.D (N).,**
Principal,
Apollo College of Nursing,
Chennai- 600 095

- 2. Prof. Lizy Sonia. A, M.Sc(N)., Ph.D (N).,**
Vice Principal,
Apollo College of Nursing,
Chennai-600 095

- 3. Prof. K. Vijayalakshmi, M.Sc(N)., Ph.D (N).,**
Professor,
Apollo College of Nursing,
Chennai- 600 095

- 4. Mrs. Nesa Sathya Satchi, M.Sc(N).,**
Professor,
Apollo College of Nursing,
Chennai- 600 095

- 5. Ms. Pappy Yuvarani, M.Sc (N).,**
Reader,
Apollo college of Nursing,
Chennai- 600 095

- 6. Ms .Tamizharasi, M.Sc (N).,**
Lecturer,
Apollo College of Nursing,
Chennai- 600 095

- 7 . Ms .Kavitha, M.Sc (N).,**
Lecturer,
Apollo College of Nursing,
Chennai- 600 095

- 8. Ms. Saraswathi, M.Sc (N).,**
Lecturer,
Apollo College of Nursing,
Chennai- 600 095

APPENDIX V

CERTIFICATE FOR CONTENT VALIDITY TO WHOMSOEVER IT MAY CONCERN

This is to certify that tools and content for the research study developed by II year M.Sc. (Nursing) student of Apollo College of Nursing for her dissertation “A pre experimental study to assess the effect of selected maternal positions upon non stress test parameters among antenatal women at selected hospitals, Chennai, was validated

Signature of the Expert

APPENDIX VI

RESEARCH PARTICIPANT CONSENT FORM

Dear participant/ bystander,

I am Nisha Thomas a M.Sc Nursing student of Apollo College of Nursing, Chennai. As a part of my study, a research on **Effectiveness of selected maternal positions upon non stress test parameters among antenatal women.**

I hereby seek your consent and co-operation to participate in the study. Please be frank and honest in response. The information obtained will be kept confidential and anonymity will be maintained.

Signature of the researcher

IHereby consent to participate my relative in this study

Place:

Date:

Signature of the participant/ bystander

APPENDIX VII
CERTIFICATE FOR ENGLISH EDITING
TO WHOMSOEVER IT MAY CONCERN

This is to certify that the dissertation “**A pre experimental study to assess the effectiveness of selected maternal positions upon non stress test parameters among antenatal women at St.Antony’s Hospital, Chennai**” by Ms.Nisha Thomas, II Year M.Sc(N)., Apollo College of Nursing was edited for English language appropriateness by




Signature

V. USHA
Asst. Prof. of English
Guru Nanak College
Velachery, Chennai - 600 042.

APPENDIX VIII


PLAGIARISM DETECTOR ORIGINALITY REPORT

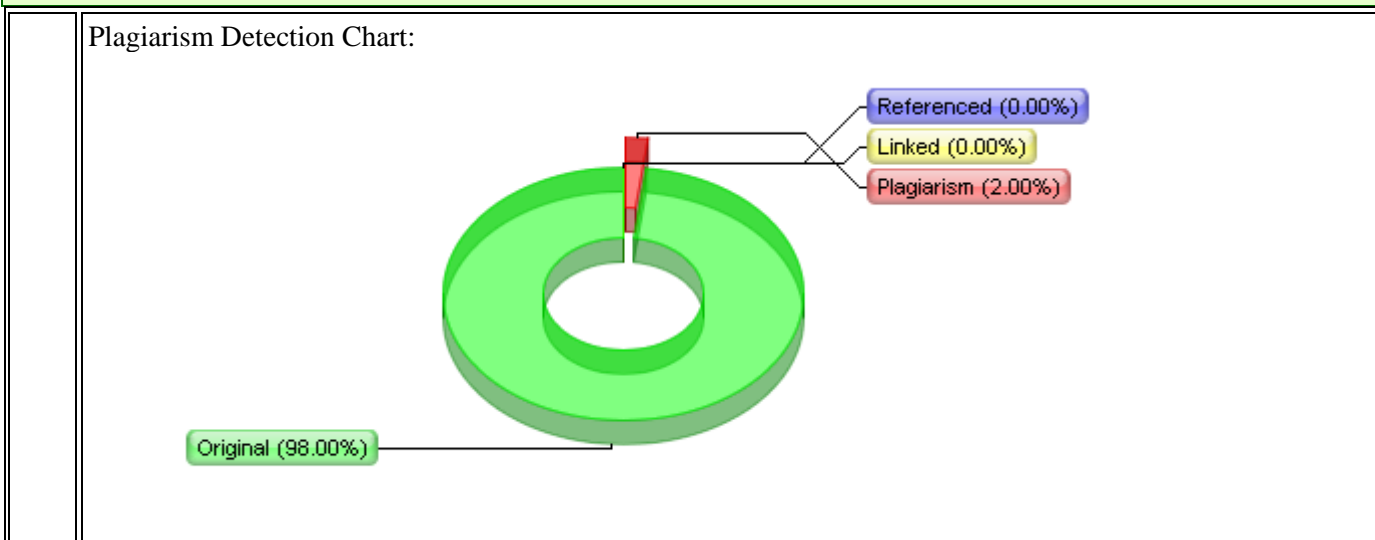
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APPENDIX IX

DEMOGRAPHIC VARIABLE PROFORMA

Purpose

This proforma is used by the researcher to collect information on demographic variables of antenatal women such as age in years, educational status, religion, occupation, type of family, family income per month in rupees, residential area, place of work, nature of work, dietary pattern and personal habits.

Instructions

The researcher will collect data by interviewing the participants and place a tick mark (√) as against appropriate responses.

Sample no:

1. Age in years

- | | |
|----------------|--------------------------|
| 1.1. 16 - 20 | <input type="checkbox"/> |
| 1.2. 21 - 25 | <input type="checkbox"/> |
| 1.3. 26 - 30 | <input type="checkbox"/> |
| 1.4. \geq 31 | <input type="checkbox"/> |

2. Educational status

- | | |
|--------------------------|--------------------------|
| 2.1. Illetrate | <input type="checkbox"/> |
| 2.2. Primary education | <input type="checkbox"/> |
| 2.3. Secondary education | <input type="checkbox"/> |
| 2.4. Higher secondary | <input type="checkbox"/> |
| 2.5. Graduate and above | <input type="checkbox"/> |

3. Religion

3.1.Hindu

3.2.Christian

3.3.Muslim

4. Occupation

4.1.Housewife

4.2.Employee

5. Type of family

5.1.Nuclear

5.2.Joint

6. Family income per month in rupees

6.1. ≤ 5000

6.2. 5001 – 10,000

6.3. $\geq 10,001$

7. Residential area

7.1.Rural

7.2.Semiurban

7.3. Urban

8. Place of work

8.1 Indoor

8.2 Outdoor

9. Nature of work

9.1 Sedentary workers

9.2 Moderate workers

9.3 Heavy workers

10. Diet

10.1 Vegetarian

10.2 Non - vegetarian

11. Personal habits

11.1 Tobacco chewing

11.2 Smoking

11.3 Alcohol

11.4 None

APPENDIX X

OBSTETRICAL VARIABLE PROFORMA

Purpose

This proforma is used by the researcher to collect data on obstetrical variables such as height, weight, gravity, parity, antenatal check – up, gestational age in weeks and any complication during antenatal period.

Instructions

The researcher will collect data by interviewing participants and place a tick mark (\surd) as against appropriate responses.

1. Height in cms

1.1. ≤ 140

1.2. 141 - 160

1.3. 161 - 180

1.4. > 180

2. Weight in kg

2.1. ≤ 40

2.2. 41 - 60

2.3. 61 - 80

2.4. > 80

3. Gravida

3.1. Primigravida

3.2. Multigravida

4. Parity

4.1.0

4.2. 1

4.3. 2

4.4. ≥ 3

5. Antenatal check - up

5.1. Regular

5.2. Iregular

6. Gestational check - up

6.1. 32 – 34

6.2. 35 - 37

6.3. > 37

7. Any complication during antenatal period

7.1. Anemia

7.2. Pregnancy induced hypertension

7.3. Gestational diabetes mellitus

7.4. No complication

8. Previous obstetrical history

8.1. Abortion

8.2. Stillbirth

8.3. Congenital anomaly

8.4. No complication

APPENDIX XI

OBSERVATION CHECKLIST

Purpose

This proforma is used to measure the physiological variables in non stress test like fetal heart rate , fetal movement and fetal reactivity.

Instructions

The researcher has to check non stress test parameters and fill the details in the record.

Time interval	Fetal heart rate			Fetal movement			Fetal reactivity		
	Supine	Left lateral	Semi fowlers	Supine	Left lateral	Semi fowlers	Supine	Left lateral	Semi fowlers
5 minute									
15 minute									

BLUEPRINT

RATING SCALE ON LEVEL OF SATISFACTION OF NURSES REGARDING EFFECT OF POSITIONS

S.No	CONTENT	ITEMS	TOTAL ITEMS	PERCENTAGE
1.	Supine position	1 ,2,3,4	4	33.33%
2.	Left lateral position	5,6,7,8	4	33.33%
3.	Semi fowlers position	9,10,11,12	4	33.33%
		TOTAL	12	100 %

APPENDIX XII

RATING SCALE ON LEVEL OF SATISFACTION OF NURSES REGARDING EFFECT OF POSITIONS

Purpose

This rating scale is designed to assess the level of satisfaction of the nurse who observed on the affect of positions.

Instruction

There are 15 items given below. Kindly read the items. Each item has four options which extent from highly satisfied to dissatisfied. Please be frank in answering the following questions. The responses will be kept confidential. Please put a tick mark (✓) in the following.

S.No.	Items	Highly satisfied (4)	Satisfied (3)	Dissatisfied (2)	Highly Dissatisfied (1)
	Satisfaction regarding intervention in supine position				
1.	Improves the level of uterine contraction				
2.	Increases fetal heart rate				
3.	Improves fetal movement				
4.	Increases acceleration				

S.No.	Items	Highly satisfied (4)	Satisfied (3)	Dissatisfied (2)	Highly Dissatisfied (1)
	Satisfaction regarding intervention in left lateral position				
5.	Improves the level of uterine contraction				
6.	Increases fetal heart rate				
7.	Improves fetal movement				
8.	Increases acceleration				
	Satisfaction regarding intervention in semi fowlers position				
9.	Improves the level of uterine contraction				
10	Increases fetal heart rate				
11	Improves fetal movement				
12.	Increases acceleration				

Scoring Key:

Scoring	Interpretation
1 – 25 %	Highly dissatisfied
31 – 50 %	Dissatisfied
51 – 75 %	Satisfied
76 – 100%	Highly Satisfied

**APPENDIX XIII
DATA CODE SHEET**

Age in years	AG	Personal habits	PH
16-20 yrs	1	Tobacco chewing	1
21-25yrs	2	Smoking	2
26-30yrs	3	Alcohol	3
≥31 yrs	4	None	4
Educational status	ES	Height in cms	HT
Illiterate	1	≤ 140	1
Primary education	2	141 – 160	2
Secondary education	3	161 – 180	3
Higher secondary	4	>180	4
Graduate and above	5	Weight in kg	WT
Religion	RELI	≤ 40	1
Hindu	1	41 – 62	2
Christian	2	61 – 80	3
Muslim	3	>80	4
Occupation	OCC	Gravida	GRAV
Housewife	1	Primigravida	1
Employee	2	Multigravida	2
Type of family	TOF	Parity	PARI
Nuclear	1	0	1
Joint	2	1	2
Family income per month in rupees	FIPM	2	3
≤ 5000	1	≥3	4
5001 – 10,000	2	Antenatal check up	AC
≥10,001	3	Regular	1
Residential area	RA	Irregular	2
Rural	1	Gestational age in weeks	GA
Semiurban	2	32 – 34	1
Urban	3	35 – 37	2
Place of work	POW	>37	3
Indoor	1	Any complication during antenatal period	CDAP
Outdoor	2	Anemia	1
Nature of work	NOW	Pregnancy induced hypertension	2
Sedentary workers	1	Gestational diabetes mellitus	3
Moderate workers	2	No complication	4
Heavy workers	3	Previous obstetrical history	POH
Diet	DIET	Abortion	1
Vegetarian	1	Stillbirth	2
Non - vegetarian	2	Congenital anomaly	3
		No complication	4

APPENDIX XIV

MASTER CODING SHEET

S.NO	DEMOGRAPHIC VARIABLE							CLINICAL VARIABLE															RESPIRATORY OUTCOME				LS	PN
	A G	SX	OC	PW	NW	H S	HA	DG	RM	TA	BM	ND	AT	VP	CP	H M	NB	HRI	HCI	RCI	HT	HS	PO	AT	5M	15M		
1	1.1	2.1	3.1	4.2	5.3	6.2	7.1	1.3	2.3	3.1	4.3	5.1	6.2	7.3	8.2	9.2	10.1	11.2	12.2	13.2	14.1	15.2	37	31	36	38	23	19
2	1.3	2.1	3.1	4.2	5.2	6.2	7.2	1.5	2.3	3.1	4.1	5.2	6.2	7.3	8.2	9.2	10.1	11.2	12.2	13.2	14.2	15.2	27	22	26	28	23	19
3	1.4	2.1	3.1	4.2	5.3	6.2	7.2	1.3	2.2	3.2	4.3	5.1	6.1	7.3	8.1	9.1	10.1	11.2	12.1	13.1	14.2	15.2	37	29	36	37	16	19
4	1.4	2.1	3.2	4.1	5.1	6.2	7.2	1.3	2.2	3.1	4.3	5.1	6.2	7.3	8.2	9.2	10.1	11.2	12.2	13.2	14.2	15.2	36	31	36	36	17	20
5	1.1	2.1	3.1	4.2	5.2	6.1	7.1	1.3	2.3	3.1	4.2	5.1	6.2	7.3	8.2	9.1	10.2	11.2	12.2	13.2	14.1	15.2	31	27	29	34	20	21
6	1.4	2.1	3.1	4.1	5.2	6.1	7.1	1.1	2.1	3.1	4.1	5.1	6.2	7.3	8.2	9.1	10.1	11.2	12.1	13.1	14.2	15.1	25	21	24	25	23	23
7	1.4	2.1	3.4	4.1	5.1	6.1	7.1	1.4	2.2	3.1	4.3	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.2	13.2	14.2	15.2	39	34	37	39	18	20
8	1.2	2.2	3.3	4.1	5.1	6.2	7.2	1.5	2.3	3.2	4.2	5.1	6.1	7.3	8.1	9.1	10.1	11.2	12.2	13.2	14.2	15.2	25.6	21.6	25.6	24.6	19	21
9	1.4	2.1	3.2	4.1	5.1	6.2	7.2	1.3	2.4	3.1	4.2	5.3	6.1	7.3	8.1	9.2	10.1	11.2	12.1	13.1	14.2	15.2	36	31	32	36	19	18
10	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.3	2.4	3.1	4.1	5.1	6.2	7.3	8.2	9.2	10.1	11.1	12.1	13.1	14.2	15.2	31	29	32	32	22	18
11	1.4	2.1	3.4	4.1	5.1	6.2	7.2	1.3	2.2	3.1	4.1	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.1	29.6	25.6	29.6	29.6	19	24
12	1.2	2.2	3.1	4.1	5.1	6.2	7.2	1.1	2.3	3.1	4.3	5.3	6.1	7.3	8.1	9.1	10.1	11.2	12.2	13.2	14.2	15.2	26.3	21.3	25.3	26.3	20	20
13	1.4	2.1	3.1	4.2	5.2	6.2	7.2	1.5	2.3	3.1	4.3	5.1	6.2	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.2	35	29	34	35	16	20
14	1.4	2.1	3.4	4.1	5.1	6.2	7.2	1.2	2.3	3.1	4.1	5.3	6.2	7.3	8.1	9.1	10.1	11.2	12.1	13.1	14.2	15.2	33	28	33	35	19	22
15	1.3	2.1	3.1	4.2	5.3	6.2	7.1	1.4	2.1	3.2	4.1	5.3	6.1	7.3	8.2	9.1	10.2	11.2	12.2	13.2	14.2	15.2	31	25	30	31	19	20
16	1.3	2.1	3.4	4.1	5.1	6.1	7.2	1.3	2.2	3.2	4.3	5.3	6.1	7.3	8.1	9.1	10.1	11.2	12.1	13.1	14.2	15.2	27.6	22.6	26.6	27.6	15	23
17	1.4	2.1	3.1	4.2	5.3	6.1	7.1	1.4	2.4	3.1	4.1	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.2	13.2	14.2	15.2	39	34	38	39	21	23
18	1.4	2.1	3.2	4.1	5.1	6.2	7.2	1.5	2.4	3.1	4.2	5.1	6.2	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.2	37	33	37	38	22	23
19	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.2	2.2	3.1	4.3	5.3	6.1	7.3	8.1	9.1	10.1	11.2	12.1	13.1	14.2	15.2	29	24	29	30	16	21
20	1.4	2.1	3.1	4.1	5.2	6.2	7.2	1.4	2.4	3.1	4.3	5.1	6.2	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.2	43	40	43	40	25	23
21	1.4	2.1	3.2	4.1	5.1	6.2	7.2	1.2	2.1	3.2	4.3	5.1	6.2	7.3	8.1	9.2	10.1	11.2	12.2	13.2	14.2	15.2	34	28	34	37	15	24
22	1.4	2.1	3.4	4.1	5.1	6.1	7.1	1.5	2.3	3.1	4.3	5.1	6.2	7.3	8.2	9.2	10.1	11.2	12.1	13.1	14.2	15.1	39.6	33.6	39.6	36.6	18	18
23	1.3	2.2	3.1	4.2	5.2	6.2	7.1	1.4	2.4	3.1	4.4	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.2	35	28	35	39	23	19
24	1.3	2.2	3.3	4.1	5.1	6.2	7.2	1.5	2.4	3.1	4.4	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.2	37.6	33.6	36.6	37.6	24	23

25	1.2	2.1	3.1	4.2	5.2	6.1	7.1	1.3	2.3	3.1	4.2	5.2	6.1	7.3	8.1	9.2	10.1	11.2	12.2	13.2	14.1	15.2	30	25	29	30	29	20
26	1.2	2.1	3.1	4.2	5.3	6.2	7.2	1.3	2.2	3.1	4.3	5.1	6.2	7.3	8.1	9.1	10.1	11.2	12.1	13.1	14.2	15.2	34	29.6	33.6	36	23	14
27	1.2	2.1	3.1	4.1	5.2	6.2	7.2	1.3	2.2	3.1	4.3	5.1	6.1	7.3	8.1	9.1	10.1	11.2	12.2	13.2	14.2	15.1	34	29	34	34	20	21
28	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.2	2.3	3.1	4.3	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.1	33	27	33	36	18	22
29	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.1	2.1	3.1	4.4	5.1	6.1	7.3	8.1	9.2	10.1	11.2	12.1	13.1	14.2	15.2	37	32	36	38	20	23
30	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.1	2.1	3.1	4.3	5.2	6.2	7.3	8.1	9.2	10.1	11.2	12.1	13.1	14.2	15.1	32.3	30.3	34.3	35.3	18	22
31	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.2	2.1	3.1	4.2	5.2	6.2	7.3	8.1	9.2	10.1	11.2	12.1	13.1	14.2	15.2	33	28	32	34	23	20
32	1.3	2.2	3.1	4.2	5.2	6.1	7.2	1.4	2.1	3.1	4.1	5.1	6.2	7.3	8.2	9.2	10.1	11.1	12.1	13.1	14.2	15.2	33	28	32	33	19	21
33	1.1	2.2	3.2	4.1	5.1	6.2	7.2	1.5	2.4	3.1	4.2	5.1	6.1	7.3	8.2	9.2	10.2	11.1	12.2	13.2	14.2	15.2	37	30	36	37	23	25
34	1.4	2.1	3.4	4.1	5.1	6.2	7.2	1.2	2.1	3.1	4.2	5.1	6.2	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.2	33	26	32	36	19	21
35	1.2	2.2	3.3	4.1	5.1	6.2	7.2	1.3	2.4	3.1	4.3	5.1	6.2	7.3	8.2	9.2	10.2	11.2	12.2	13.2	14.2	15.2	35	30	35	36	18	23
36	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.2	2.3	3.1	4.2	5.1	6.1	7.3	8.1	9.1	10.1	11.2	12.2	13.2	14.2	15.2	30.3	23.3	29.3	29.3	16	19
37	1.4	2.1	3.4	4.1	5.1	6.2	7.2	1.3	2.2	3.1	4.1	5.2	6.1	7.3	8.2	9.1	10.1	11.2	12.1	13.1	14.2	15.1	32	26	31	38	31	18
38	1.2	2.2	3.3	4.1	5.1	6.2	7.2	1.1	2.1	3.1	4.3	5.1	6.2	7.3	8.1	9.1	10.1	11.1	12.1	13.1	14.2	15.2	28	22	26	30	23	20
39	1.1	2.1	3.1	4.2	5.3	6.2	7.1	1.2	2.1	3.1	4.3	5.1	6.2	7.3	8.2	9.2	10.2	11.2	12.2	13.2	14.2	15.2	39	33	38	37	32	21
40	1.2	2.1	3.1	4.2	5.3	6.1	7.1	1.4	2.2	3.1	4.2	5.1	6.1	7.3	8.1	9.1	10.1	11.2	12.2	13.2	14.2	15.1	34	30	34	36	19	24
41	1.3	2.2	3.1	4.2	5.2	6.2	7.2	1.5	2.4	3.1	4.2	5.2	6.2	7.3	8.2	9.1	10.2	11.2	12.2	13.2	14.2	15.2	32	31	35	35	14	20
42	1.2	2.1	3.1	4.2	5.3	6.1	7.1	1.3	2.2	3.1	4.3	5.1	6.2	7.3	8.2	9.2	10.1	11.1	12.2	13.2	14.2	15.2	35.6	30.6	33.6	37.6	22	19
43	1.3	2.1	3.1	4.1	5.2	6.2	7.2	1.5	2.4	3.1	4.2	5.3	6.2	7.3	8.2	9.2	10.1	11.2	12.1	13.1	14.2	15.2	24	18	21	27	17	21
44	1.2	2.1	3.1	4.2	5.2	6.1	7.1	1.3	2.3	3.2	4.4	5.2	6.2	7.3	8.2	9.2	10.1	11.2	12.2	13.2	14.1	15.2	26	25	26	25	25	21
45	1.4	2.1	3.4	4.1	5.1	6.2	7.1	1.3	2.3	3.2	4.3	5.3	6.1	7.3	8.1	9.1	10.1	11.2	12.1	13.1	14.1	15.1	34	28	32	37	22	16
46	1.4	2.1	3.4	4.1	5.2	6.1	7.1	1.1	2.2	3.1	4.3	5.3	6.1	7.3	8.1	9.1	10.1	11.2	12.1	13.1	14.2	15.1	26	23	27	27	20	19
47	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.1	2.1	3.1	4.1	5.3	6.1	7.3	8.1	9.1	10.1	11.2	12.2	13.2	14.2	15.2	29	25	29	29	17	20
48	1.1	2.2	3.2	4.1	5.1	6.2	7.2	1.3	2.3	3.1	4.2	5.1	6.1	7.3	8.2	9.1	10.2	11.2	12.2	13.2	14.1	15.2	38	36	38	44	16	21
49	1.4	2.1	3.4	4.2	5.1	6.2	7.2	1.4	2.4	3.1	4.1	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.2	41	37	42	42	19	26
50	1.3	2.1	3.1	4.1	5.2	6.2	7.2	1.5	2.4	3.1	4.2	5.3	6.1	7.3	8.1	9.2	10.1	11.2	12.2	13.2	14.2	15.1	32	30	32	33	25	20

25	1.2	2.1	3.1	4.2	5.3	6.1	7.1	1.3	2.2	3.2	4.3	5.3	6.1	7.3	8.1	9.1	10.1	11.2	12.2	13.2	14.1	15.1	33	22	31	32	19	21
26	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.3	2.2	3.1	4.3	5.1	6.2	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.1	15.2	33	23	32	36	20	14
27	1.1	2.1	3.1	4.2	5.2	6.1	7.1	1.3	2.3	3.2	4.2	5.3	6.1	7.3	8.1	9.2	10.1	11.2	12.2	13.2	14.1	15.2	30	21	30	36	23	23
28	1.2	2.1	3.1	4.2	5.2	6.1	7.2	1.3	2.3	3.1	4.2	5.1	6.2	7.3	8.2	9.2	10.2	11.2	12.2	13.2	14.1	15.2	33	24	33	39	28	24
29	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.5	2.4	3.1	4.3	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.1	35	26	35	41	23	19
30	1.4	2.1	3.4	4.1	5.1	6.2	7.2	1.4	2.2	3.1	4.1	5.2	6.2	7.3	8.1	9.1	10.1	11.2	12.1	13.1	14.2	15.2	29.6	22.6	28.6	30.6	16	21
31	1.2	2.1	3.1	4.2	5.3	6.1	7.2	1.5	2.3	3.1	4.3	5.2	6.2	7.3	8.2	9.1	10.1	11.2	12.2	13.2	14.1	15.2	36	26	34	38	24	26
32	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.5	2.3	3.1	4.3	5.1	6.1	7.3	8.2	9.2	10.1	11.2	12.1	13.1	14.2	15.2	38.6	29.6	37.6	38.6	21	18
33	1.3	2.1	3.1	4.2	5.2	6.2	7.2	1.5	2.2	3.1	4.2	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.2	13.2	14.2	15.2	26	17	26	32	18	15
34	1.2	2.2	3.3	4.1	5.1	6.2	7.2	1.3	2.2	3.1	4.3	5.1	6.2	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.2	38	32	37	40	18	20
35	1.2	2.1	3.1	4.2	5.2	6.2	7.2	1.3	2.3	3.1	4.3	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.2	13.2	14.1	15.2	38	29	37	38	19	18
36	1.1	2.1	3.2	4.1	5.1	6.1	7.1	1.3	2.3	3.1	4.2	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.2	13.2	14.2	15.2	39	33	39	39	15	22
37	1.1	2.1	3.2	4.1	5.1	6.2	7.2	1.3	2.3	3.1	4.2	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.2	13.2	14.2	15.2	38.6	27.6	37.6	37.6	11	19
38	1.3	2.1	3.1	4.1	5.2	6.2	7.2	1.3	2.4	3.1	4.3	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.2	40	34	39	37	18	22
39	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.3	2.3	3.1	4.3	5.1	6.2	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.2	35	26	35	34	15	21
40	1.4	2.1	3.1	4.1	5.1	6.2	7.2	1.3	2.4	3.2	4.3	5.1	6.1	7.3	8.1	9.2	10.1	11.2	12.1	13.1	14.2	15.2	34.3	24.3	31.3	33.3	23	18
41	1.1	2.1	3.2	4.1	5.1	6.2	7.2	1.3	2.3	3.1	4.3	5.1	6.2	7.3	8.2	9.2	10.2	11.2	12.2	13.2	14.1	15.2	32	25	31	32	20	17
42	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.4	2.2	3.1	4.3	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.1	13.1	14.2	15.2	35	28	34	34	21	21
43	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.5	2.4	3.1	4.3	5.2	6.2	7.3	8.1	9.2	10.1	11.2	12.1	13.1	14.2	15.1	37	27	35	37	23	19
44	1.3	2.1	3.1	4.2	5.2	6.1	7.2	1.4	2.4	3.1	4.3	5.1	6.1	7.3	8.2	9.1	10.2	11.2	12.2	13.2	14.2	15.2	36	24	33	36	12	18
45	1.4	2.1	3.4	4.1	5.1	6.2	7.2	1.3	2.2	3.1	4.2	5.1	6.2	7.3	8.1	9.2	10.1	11.2	12.1	13.1	14.2	15.2	40.3	31.3	39.3	43.3	25	19
46	1.4	2.2	3.3	4.1	5.1	6.2	7.2	1.4	2.3	3.1	4.1	5.1	6.2	7.3	8.1	9.2	10.1	11.1	12.1	13.1	14.2	15.2	30	22	29	32	24	20
47	1.4	2.2	3.1	4.2	5.1	6.2	7.2	1.5	2.4	3.2	4.3	5.1	6.1	7.3	8.2	9.2	10.1	11.2	12.1	13.1	14.2	15.1	33	25	32	33	20	20
48	1.3	2.1	3.1	4.2	5.2	6.2	7.2	1.3	2.2	3.1	4.3	5.1	6.1	7.3	8.1	9.2	10.1	11.2	12.1	13.1	14.2	15.1	35.6	26.6	35.6	39.6	14	22
49	1.3	2.1	3.1	4.2	5.2	6.1	7.1	1.3	2.2	3.1	4.3	5.1	6.2	7.3	8.1	9.2	10.1	11.2	12.1	13.1	14.2	15.2	27	18	26	28	17	21
50	1.1	2.2	3.2	4.1	5.1	6.2	7.2	1.3	2.2	3.1	4.2	5.1	6.1	7.3	8.2	9.2	10.2	11.2	12.2	13.2	14.2	15.1	33	25	29	27	19	21

APPENDIX XV
PHOTOGRAPHS DURING NON STRESS TEST

