MATERNAL AND FETAL OUTCOME IN PREGNANCIES WITH BORDERLINE AMNIOTIC FLUID INDEX

Dissertation submitted to
The Tamilnadu Dr. M.G.R. Medical University,
Chennai – 600032
with partial fulfillment of the regulations
for the award of degree of

M.S – BRANCH - II

OBSTETRICS AND GYNAECOLOGY

K.A.P.Viswanatham Government Medical College
Tiruchirappalli
The Tamilnadu Dr.M.G.R.Medical University
Chennai

APRIL 2015

CERTIFICATE

This is to certify that this dissertation titled **"MATERNAL AND FETAL OUTCOME IN PREGNANCIES WITH BORDERLINE AMNIOTIC FLUID IN MAHATMA GANDHI MEMORIAL HOSPITAL, TIRUCHIRAPPALI"** is a bonafide work of **DR.SIVAGAMI SUNDARI.S.,** Postgraduate M.S.Obstetrics and Gynaecology, Department of Obstetrics and Gynaecology, K.A.P.Viswanatham Government Medical College, Trichy and has been prepared by her under our guidance. This has been submitted in partial fulfillment of regulations of **The Tamilnadu Dr. M.G.R. Medical University, Chennai -32 for the award of M.S. Degree in Obstetrics and Gynaecology.**

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DECLARATION

I **Dr.Sivagami Sundari.S**, solemnly declare that this dissertation titled, **"MATERNAL AND FETAL OUTCOME IN PREGNANCIES WITH BORDERLINE AMNIOTIC FLUID INDEX IN MAHATMA GANDHI MEMORIAL HOSPITAL, TRICHY"** is a bonafide work done by me at K.A.P.Viswanatham Government Medical College, Trichy, during 2012-2015 under the guidance and supervision of Head of the Department , Department of Obstetrics and Gynaecology **PROF.Dr.D.PARIMALADEVI, M.D,D.G.O.**

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ACKNOWLEDGEMENT

I am extremely grateful to **The Dean, PROF.Dr.P. KARKUZHALI, M.D. K.A.P.Viswanatham Government Medical College, Tiruchiraappalli** for granting me permission to undertake the study and to avail the facilities needed for my dissertation work.

It gives me immense pleasure to express my gratitude and thanks to my respected **PROF. Dr. D. PARIMALA DEVI , M.D.,D.G.O.** Professor and Head of the Department, Obstetrics and Gynaecology who gave immense support and encouragement and all the facilities to complete this work.

I sincerely express my gratitude and thanks to my respected **PROF. Dr. D.UMA, M.D.D.G.O** Associate Professor, Obstetrics and Gynaecology Department.

I sincerely thank my teacher, guide and mentor Senior Assistant **Prof. Dr. S.Prasanna Lakshmi** for her valuable guidance and support.

My heartfelt thanks to all my assistant professors for their guidance in my study.

I owe my thanks to all my patients ,my statistician Mr.Jesus Raja for their co-operation to complete my work.

On the whole I thank **GOD** for all.

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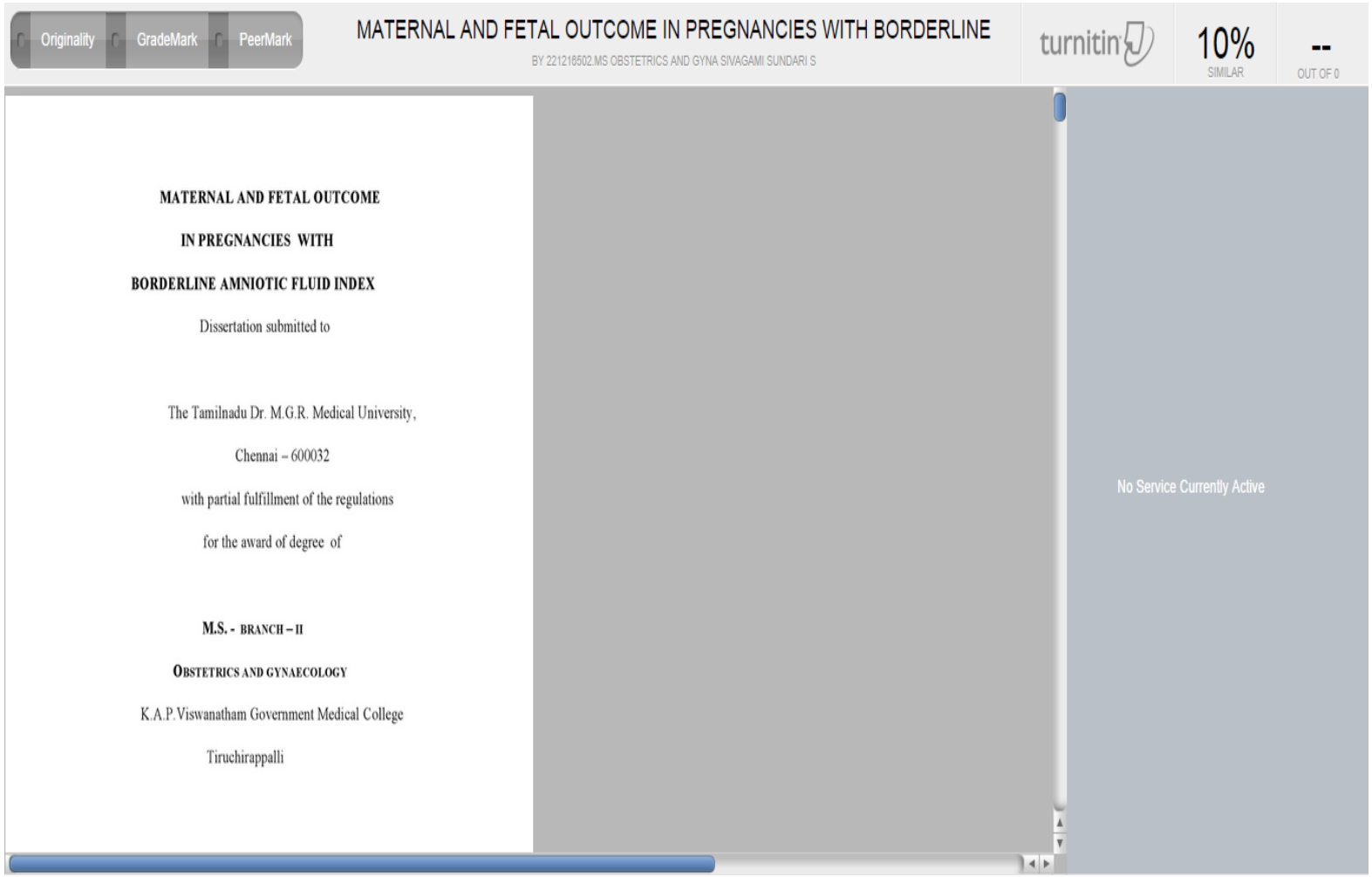
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Word count:	9,821
Character count:	55,763
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MATERNAL AND FETAL OUTCOME

IN PREGNANCIES WITH

BORDERLINE AMNIOTIC FLUID INDEX

CONTENTS

LIST OF TABLES

LIST OF CHARTS

LIST OF FIGURES

INTRODUCTION

INTRODUCTION

Amniotic fluid is the fluid in the amniotic cavity which gives the protective environment for fetus to nourish, breath, utilize nutrients and grow. It has got a dynamic physiology throughout pregnancy enriching the fetal growth.

Amniotic fluid volume significantly affects the perinatal outcome, hence necessitates its measurement. Many methods are practiced worldwide with every method having both advantage and limitations.

Sonographic measurements helps in assessing amniotic fluid volume antenataly and intrapartum period as it is non invasive and easy to use. Also it is comparable with invasive methods.

Amniotic fluid index is the sonographic method used to assess the amniotic fluid volume expressed in various figures by different groups. On the whole it is used to assess the fetal well being as it comes as a part of biophysical profile as an integral part. Score 8 and above though considered normal weightage given more to amniotic fluid score and been decided with it.

Perinatal outcome as per the various studies conducted and analysed retrospectively shows that its been adversely affected in pregnancies with oligohydramnios.

Hence it signifies the monitoring of patients with reduced amniotic fluid antenatally and during intrapartum period .

The study carried out was to observe the maternal and fetal outcome in Borderline Amniotic fluid index patients and to assess the need for monitoring in these patients.

AIM OF THE STUDY

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The aim of the study is to observe the maternal and fetal outcome in pregnancies with Borderline Amniotic Fluid Index i;e 5cm to 8cm.

OBJECTIVE OF THE STUDY

OBJECTIVES OF THE STUDY

The main objectives of the study are:

1) Assessing the fetal outcome in pregnancies with Borderline Amniotic fluid index with using sonographic method using Amniotic fluid index as principle and Non stress test (cardiotocogram during labour) both as tools
2) Assessing the maternal outcome in pregnancies with Borderline Amniotic fluid index with effect of borderline amniotic fluid as such on maternal conditions such as mode of delivery and after delivery effects.
3) Assessing the need for monitoring the pregnancies with Borderline Amniotic Fluid Index.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

AMNIOTIC FLUID

The fluid surrounding the fetus in amniotic cavity which gives the environment for fetus to grow

PHYSICAL CHARACTERS:

PH	:	Slightly alkaline 7.2
Osmolality	:	Hypotonic (addition of fetal urine which is highly hypotonic) 250mmol/l
Colour[1]	:	Prior to 20 weeks: pale straw to deep yellow(due to bilirubin)
36 weeks	:	Colourless
Term	:	White floccules(clumps of desquamated fetal skin cells and free lipid material)

ABNORMAL COLOUR

Meconium stained (green)	:	Fetal distress/breech presentation
Greenish yellow (saffron)	:	Post maturity
Dark colour (blood stained)	:	Accidental hemorrhage
Dark brown	:	Intra uterine death

COMPOSITION:

Concentration of components varies throughout pregnancy accordingly the source

The composition includes:

1. Water 98-99%

2. Solid 1-2%

Solid constituents near term:

Organic protein	:	0.3 gms% -0.5 gms%
Non protein nitrogen	:	24-30 mg%
Glucose	:	20 mg%
Urea	:	30mg%
Uric acid	:	4-5 mg%
Creatinine	:	2 mg%
Total lipids	:	50mg%
Hormones	:	
Inorganic	:	

Electrolytes:

Same as maternal plasma except near term sodium and chloride reduce but potassium remains same

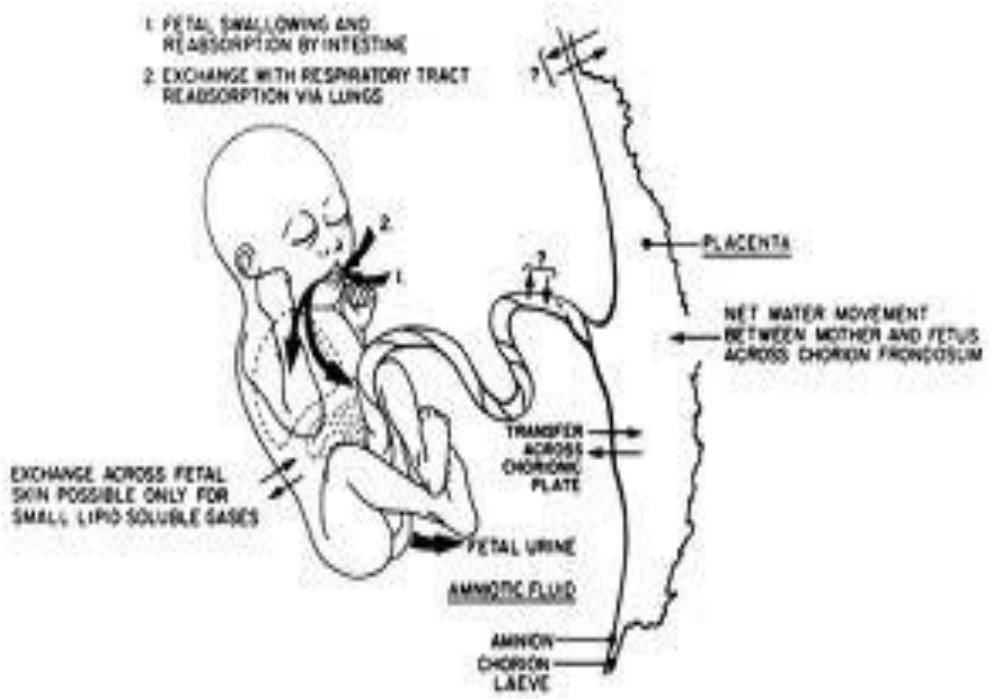
Suspended particles:

This includes lanugo, exfoliated squamous epithelial cells of skin, vernix caseosa, cast off amniotic cells and cells of respiratory tract, urinary bladder, and vagina of the fetus.

Hormones in liquor amnii:

Cortisone, 17- hydroxy corticosteroids, Pregnanediol Progesterone, 17-Ketosteroid , Estriol, Hcg Hpl, Prostaglandins E1 and E2

DYNAMICS OF AMNIOTIC FLUID



FIGURE[(2)]1

Physiology of amniotic fluid formation and elimination source of amniotic fluid varies with gestation period.

In first trimester water and solutes traverse freely through the fetal skin from maternal plasma and amniotic fluid is mainly the diasylate of maternal plasma.

In second trimester fetal skin keratinize, following which fetal urine forms the major source with fetal lung liquid and oral and nasal secretions.

FORMATION:

Initial gestational age chorionic frondosum[3] which develops into fetal surface of placenta forms the major site of transfer of water and solutes between fetal blood and amniotic fluid. once the fetal urination starts by 8 to 10 weeks[4] eventually with fetal skin keratinisation in mid 2nd trimester fetal urine forms the major source.

Fetal lung[5] plays major role in secretion of amniotic fluid than resorption signified by when tracheal ligation is done fetal lung distends with secretions

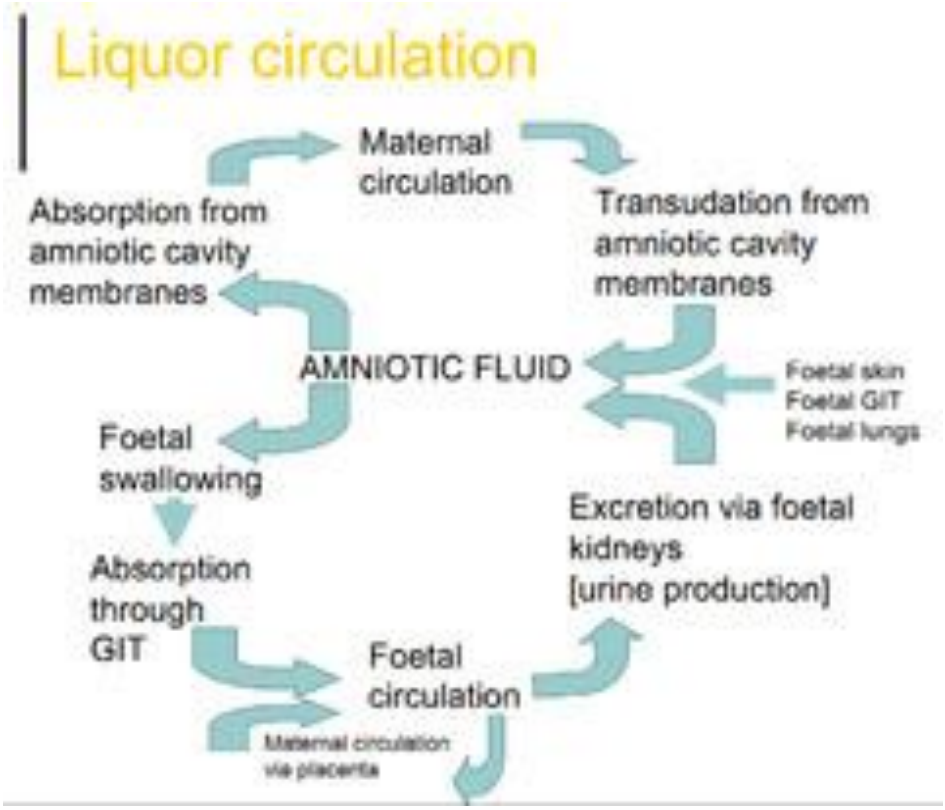


FIGURE 2

Amniotic fluid circulation - schematic representation

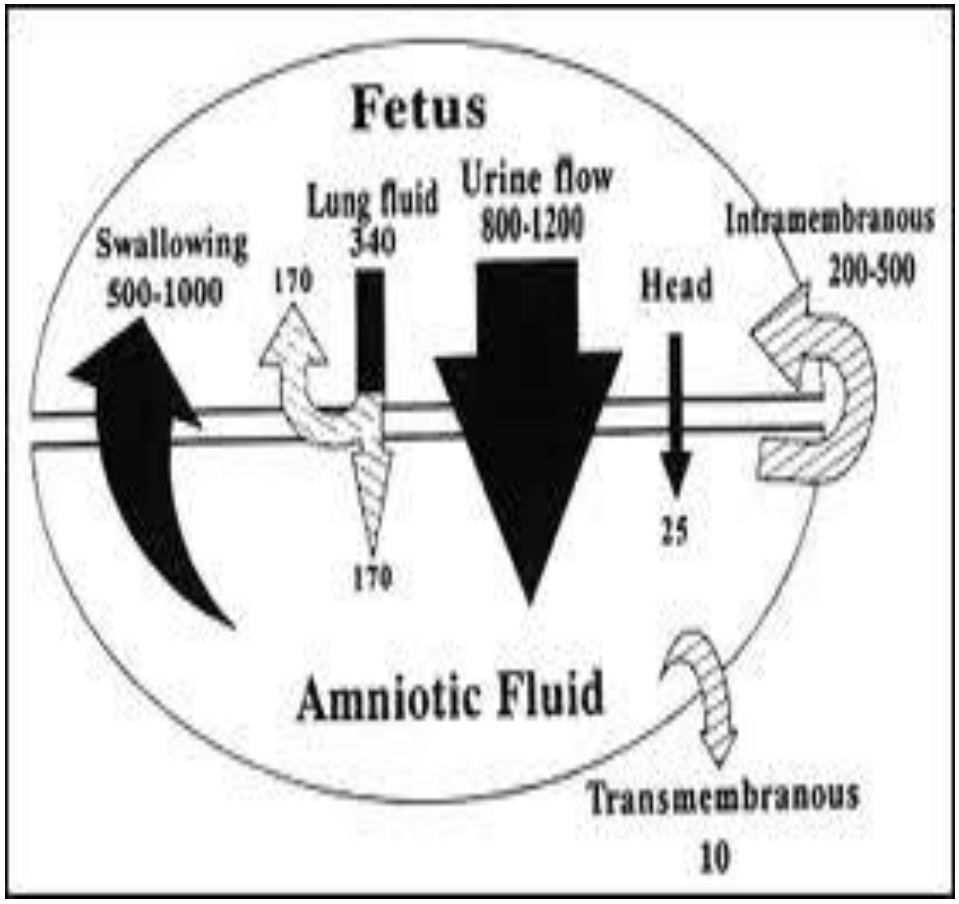


FIGURE 3

Schematic representation of flow into and out of amniotic fluid

FLOW INTO AMNIOTIC SAC[6]:

Fetal urine – 800to1200ml/day

Fetal lung liquid – 170ml/day

Oral nasal secretions – 25ml/day

FLOW OUT OF AMNIOTIC SAC[6]:

Fetal swallowing – 500to1000ml/day

Intramembranous flow – 200to400ml/day

Transmembranous flow – 10ml/day

ELIMINATION

Fetal swallowing[7] starts by 16 weeks of gestation age following which amniotic fluid is eliminated mainly through swallowing which is absorbed through gastro intestinal tract and recycled. It is about 500 to 1000ml/day.

Pritchard[8] in 1965 injected radioactive chromium labeled erythrocytes into the amniotic fluid and measured the chromium content in amniotic fluid at CS and chromium recorded from infant diapers during the first 5 days of life. Results showed that the term fetus swallows 155 ml/kg/day.

Bulk flow which is hydrostatic and oncotic forces is supported when hypotonic amniotic fluid comes near the chorionic plate it gets absorbed through intercellular channels[9] in placenta

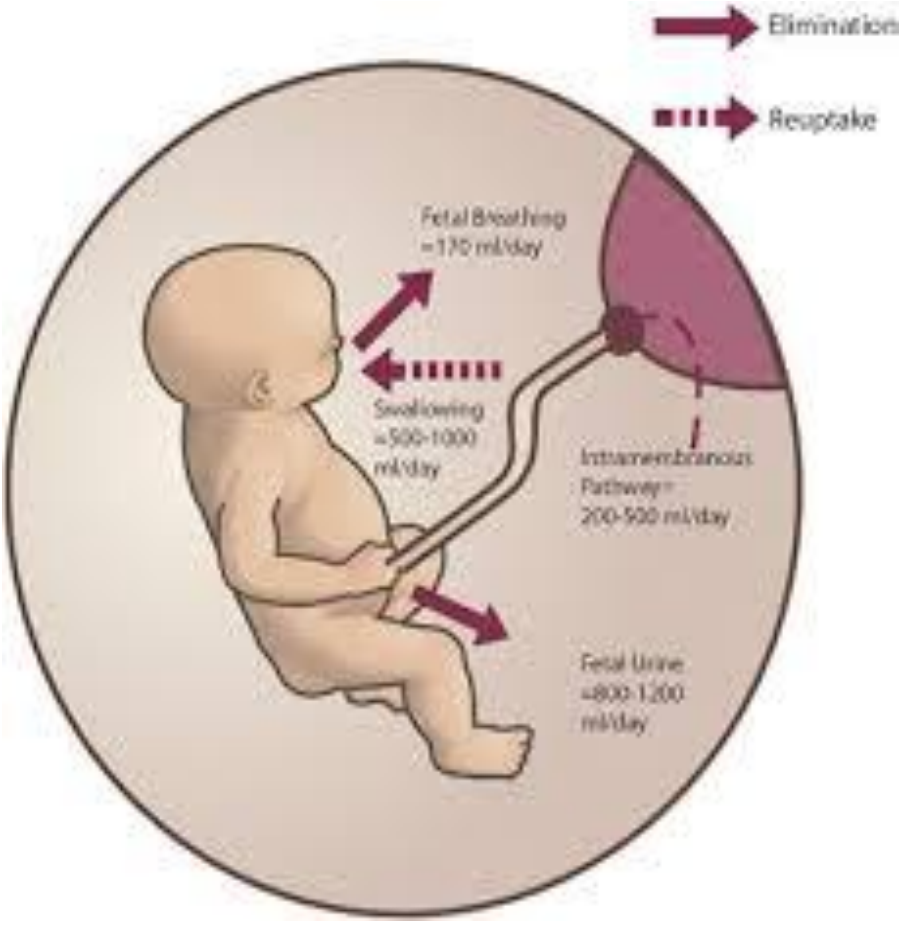


FIGURE 4:

Elimination of amniotic fluid and reuptake

PHYSIOLOGICAL REGULATION OF AMNIOTIC FLUID

Near term almost 1000 ml of fluid is poured into amniotic cavity and the same is reabsorbed daily which maintains the volume. aberrations in this regulation may lead to polyhydramnios or oligohydramnios. Fetal swallowing and urination are under regulation which maintains the volume –the evidence that amniotic fluid is a active component of feto-placental-maternal unit.

Hormonal regulation is evident from that prolactin[10] infusion results in decrease in volume due to resorption into maternal plasma evident by decrease in maternal plasma cell volume.

Maternal hydration also regulates the volume. maternal hydration by drinking two litres per day has been proved to have aduqate amniotic fluid volume through intercellular pathways.

AMNIOTIC FLUID VOLUME

AFV increases with gestational age progressively till second trimester and moderately in third trimester until term then decreases post term.

Volumes at varies gestational age:

weeks of gestation	volume(ml)
10	25
16	200
20	400
28	1000
36	900
40	800

A recent study by Brace and Wolf[11] provides a coherent description of amniotic fluid volumes during gestation. They reviewed 705 determinations of AFV in normal pregnancies between 8 and 43 weeks gestation in 12 published studies. All the measurements were based on either direct quantitation of fluid collected at hysterectomy or indicator- dilution of AFV. From the data collected, they determined that AFV progressively increased during gestation until approximately 33 weeks.

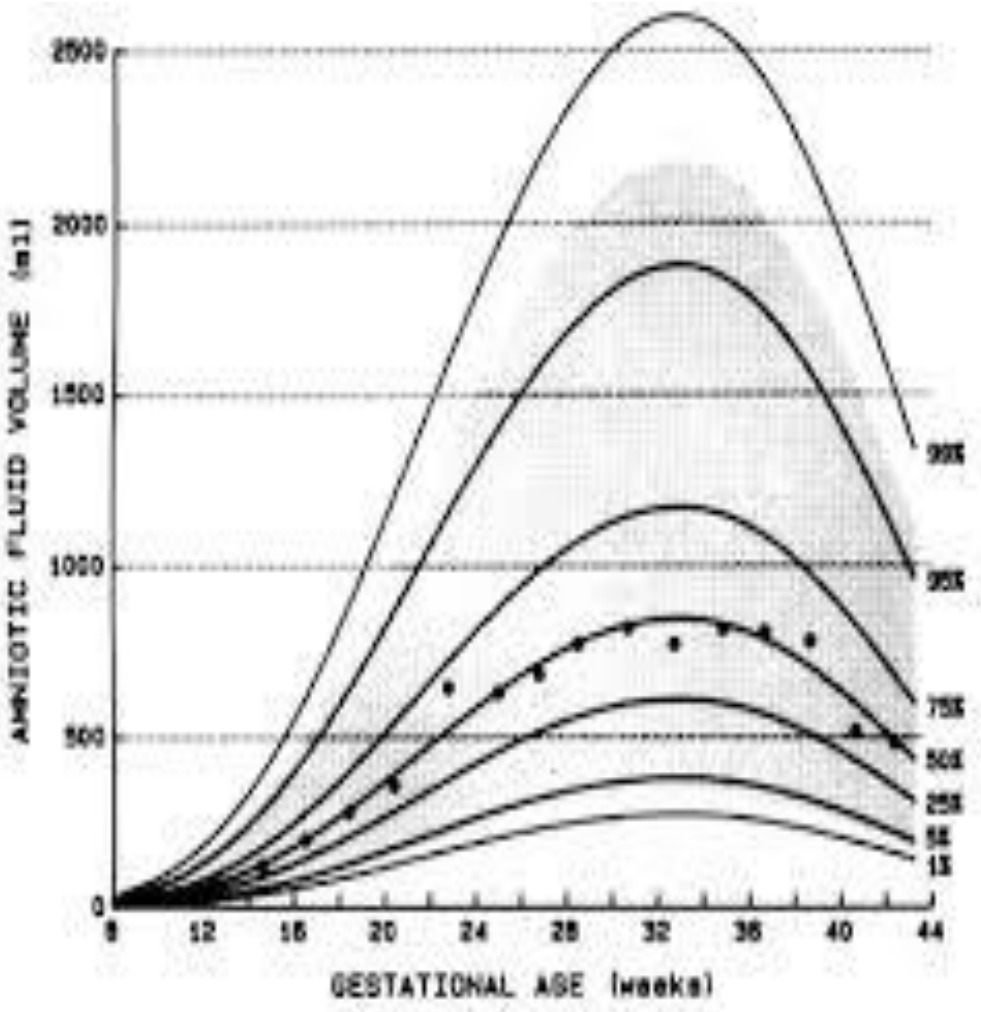


FIGURE 5

Normogram showing Amniotic Fluid Respect to Gestational Age [12]

Thus the facts evident from the graph are: AFV increases gradually upto 32 week then reduce near term then to 400 ml post term

AMNIOTIC FLUID VOLUME ASSESSMENT

Assessment of amniotic fluid volume (AFV) helps in the fetal surveillance as aletered amniotic fluid level- both decreased and increased, Increases the perinatal risk

Various methods to assess the AFV:

a) Clinical method

b) Semi-quantitative method (Sonographic)

c) Quantitative method

CLINICAL METHOD

Assessing the uterine size by palpation and whether it is corresponding to gestational age gives an idea of amniotic fluid. Uterine size less than the gestational age and uterus occupied by fetus may suggest decreased liquor. Uterine size more than the gestational age, easy ballotment and faded fetal heart sound suggest increased liquor. But clinical method gives poor correlation for AFV except for experienced people observations.

FIGURE 6

Clinical method of assessing amniotic fluid volume

SEMI-QUANTITATIVE METHOD (SONOGRAPHIC METHOD)

Assessing AFV by ultrasonogram using various methods has got both pros and cons though used in day to day life to assess AFV henceforth the fetal surveillance.

Sonographic methods include:

1. Subjective assessment.
2. Single-deepest -pocket measurement.
3. Four-quadrant amniotic fluid index.
4. Planimetric measurement of total intrauterine volume.
5. Mathematical formulae for volume calculation.
6. Two – diameter pocket

1) Subjective method:

This uses Real time ultrasound to assess the AFV. Ultrasonographer determines the echo free fluid around the fetus and the space occupied by fetus and placenta, then categories the AFV as increased, normal, and decreased.

Chamberlain et al[13] studied the methods of measuring AFV and proposed this method in which the single deepest vertical pocket of uninterrupted amniotic fluid and measure it. The vertical diameter of 2cm to 8cm is the cut-off of normal AFV. Also called maximum vertical pocket. Value below 2cm is oligohydramnios and above 8cm is polyhydramnios. Value below 1cm though rare as noted by Bottoms

et al [14] Hoddick [15] is considered to associated with adverse perinatal outcome.

Chamberlain et al findings with maximum vertical pocket:

AFV	MVP(cm)
Increased	>/=8
Normal	2-8
Marginal	<2
Decreased	</=1

Four-quadrant amniotic fluid index:

This was first described by Phelan [16]. The amniotic fluid index is determined by dividing uterus into four quadrants by sagittal and transverse lines through the umbilicus and summing the vertical dimension of the deepest pocket in each quadrant. When the sum is below 8 cm is borderline reduced and when below 5 cm it is oligohydramnios and one above 20 cm is polyhydramnios.

Planimetric measurement of fetal intrauterine volume:

Total intrauterine volume can be estimated by obtaining multiple scans through the uterus at regular intervals. The intrauterine area is determined on each scan and multiplied by the width of the

interval. These values are summed to yield the total intrauterine volume.

Mathematical formula for volume calculation:

A variety of formulae using sonographic measurements to approximate total intrauterine volume, total intrauterine volume minus fetal and volume of the larger pocket have been proposed. However all these approaches make the assumption that the uterus (or fetus, placenta or deepest pocket) confirm to a regular shape, such as an ellipsoid.

Two diameter pocket:

This was described by Magann and co-workers [17] in 1992. This technique is variation on the vertical pocket assessment of AFV. The two – diameter technique consists of identifying the deepest amniotic fluid pocket by using measuring its vertical and horizontal dimension and then multiplying these values together. A value of 0-15 cm^2 represent oligohydramnios, 15.1 – 50 cm^2 represents normal and value of 75 cm^2 represent hydramnios.

Colour Doppler imaging:

Accurate estimation of the AFI, as the colour flow highlights the umbilical cord which may appear echolucent on B mode imaging and can be mistaken for a liquor pocket.

Quantitative assessments:

1. Collecting amniotic fluid at hysterotomy or pregnancy termination.
2. Indicator dilution technique

A known quantity of a measurement substance, the indicator, is instilled into the amniotic cavity. The concentration of the indicator in a withdrawn sample is inversely proportional to the volume of amniotic fluid. The use of dilution principle to determine AFV was developed over period of decades. In 1933 Duckman and Davis injected congo red transperitoneally into the amniotic sac of term pregnancy. They calculated the volume of distribution of the indicator. Charles and co-workers standardized the indicator dilution technique for AFV assessment. They used PAH (Para amino hippurate) which is inert, evenly distributes within the amniotic compartment and does not cross the placental barrier or amniotic epithelium. Thompson and colleagues later refined the PAH dilution technique by using a more simple and rapid spectrophotometric method for measuring the concentration of indicator in the withdrawn sample.

AMNIOTIC FLUID INDEX

Phelan et al [16] in 1987 studied a method to assess the AFV by measuring the vertical pocket in four quadrants of uterus with linea nigra and umbilicus as the landmarks.

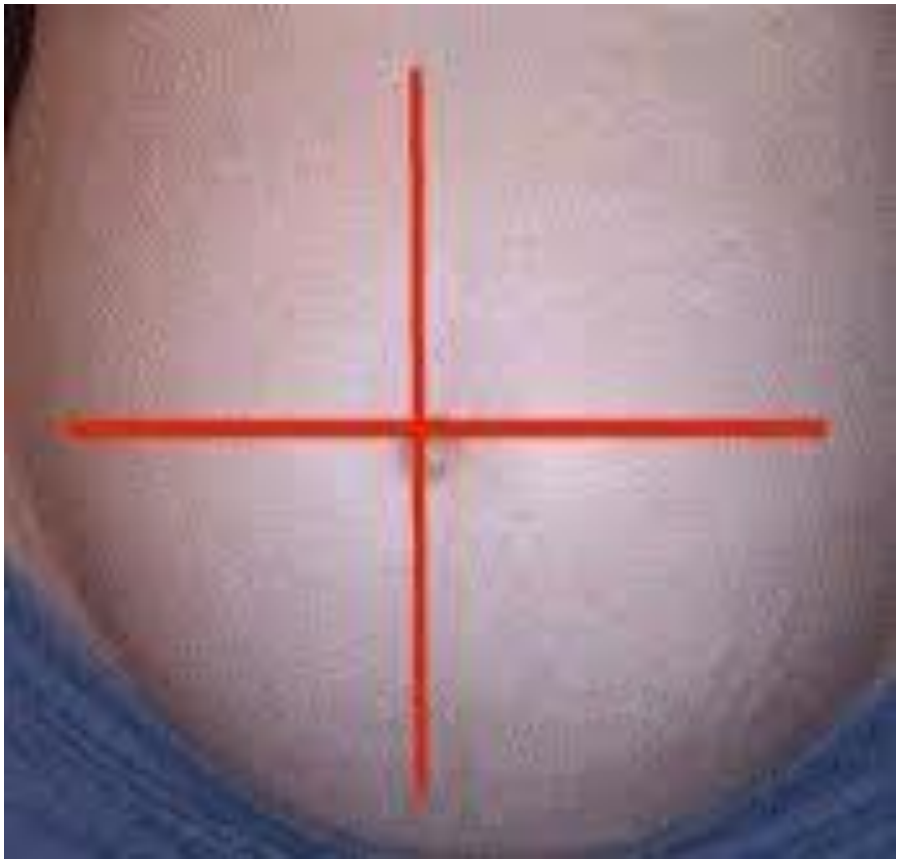


FIGURE 7

Measurement of four quadrant amniotic fluid index

Technique [18] used to measure the amniotic fluid index is the following:

1) A linear, curvilinear or sector transducer is used
2) Maternal abdomen is divided into four quadrants with maternal sagittal plane vertically and arbitrary transverse line halfway between the symphysis pubis and upper end of uterus
3) Transducer is placed in maternal sagittal plane vertically perpendicular to coronal plane
4) The pocket without umbilical cord structures and extremities is taken for measurement
5) The vertical measurement is taken and all four measurements are summed up for the final

AMNIOTIC FLUID INDEX (AFI)

If the AFI is less than 8 method is repeated three times and average is taken Interpretation of Phelan et al[16] is

AFV	AFI(in cm)
Oligohydramnios	</=5
Borderline	5.1 to 8
Normal	8.1 to 20
Polyhydramnios	>/=21

Rutherford et al [19] reviewed the study whether to include the pockets with cord structures and extremities and concluded that the sensitivity increases if not included various study groups reviewed the method and gives different ideas to say oligohydramnios

Moore and Cayle et al[20] takes less than fifth percentile as ligohydramnios.

Jeng et al[21] takes 8cm as the cut off value

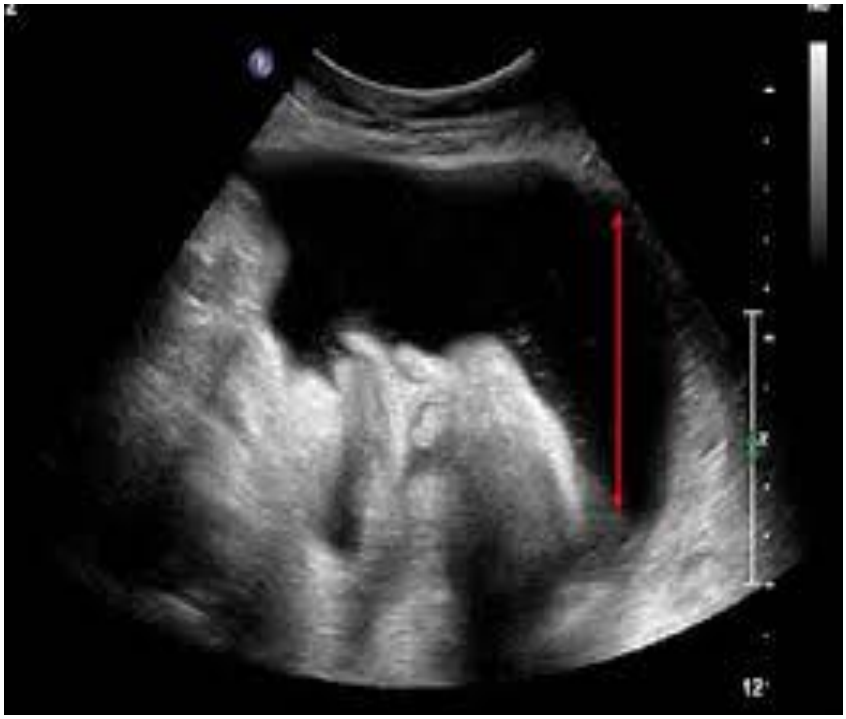


FIGURE 8

Ultrasound picture of measuring amniotic fluid index

Pitfalls in AFI measurement [(22)]:

1) Cord structures should not be used; Colour Doppler helps in identifying the umbilical cord.
2) Maternal abdomen fat scatters the beam and interprets the pocket as containing less fluid; lower frequency is used to avoid this.
3) Third trimester vernix appears as free floating particles which makes the fluid less conspicuous.
4) Single vertical pocket sometimes misinterpret the fluid volume; hence four quadrant should be taken

Though there is no single proven method to assess the AFV which would interpret the fetal well being the method more sensitive and can be used repeatedly with the patients is accepted; which is Amniotic fluid Index

AFI is favored as:

1. It assesses the total amount of fluid within the intra amniotic cavity and not just a single pocket.
2. The curve of AFI against gestational age is remarkably similar to that generated from dye – dilution or direct measurement studies.
3. The technique has been standardized to reduce the interobserver variation between examiner and institutions.
4. It provides a measurement of amniotic fluid that can be followed on subsequent examinations.
5. It is more sensitive than a single vertical pocket measurement.

Indications for & Frequency of Amniotic Fluid Volume:

Given the convenience and reproducibility of the AFI, its use in fetal well being - assessments has expanded remarkably.

Suggested indications for AFV evaluation are summarized as follows:

During the routine or targeted ultrasound examination after 16 weeks

The precise AFI value and associated gestational percentage offer valuable clues to existing disease (congenital anomalies) and provides a precise reference point against which future values can be compared, particularly should pregnancy complication arise subsequently.

During antepartum testing: Several recent studies have underscored the value of including the AF1 when performing non stress testing in at-risk pregnancies, in fact the two together constitute what is known as modified bio-physical profile as proposed by Vintzelos et al. The frequency at which AFI evaluations should be repeated during antepartum testing is not established. Ideally the choice of testing frequency will be based on the data regarding the rate of decrease in AFI during pathologic pregnancy status. Marks and Divon[23] reported the change in AFI during the post term period averaged 25% per week. Lagrew and associates [24] studied the change in AFI with time during twice- weekly antepartum testing, patients with normal AFI (> 8cm) had 0.54 percent chance of oligohydramnios developing in the next 4 days. Whereas those with low normal AFI (5-8 cm) had a 5% chance of developing oligohydramnios in the next 4 days. These results suggest that AFI can be repeated weekly if the value is greater than the 10th percentage but should be evaluated more frequently if the value is in marginal range.

Monitoring patients with PPROM: Serial evaluation of amniotic fluid volume may provide important prognostic information in patients with ruptured membrane before term, who are at increased risk for fetal distress, amnionitis and pre-term labour.Evaluation of AFV on admission with PPROM and then weekly in conjunction with periodic assessment of fetal heart rate tracing provides useful prognostic information about the risk for amnionitis impending labour and the likelihood of intrapartum umbilical cord compression.

Weeks	2.5th	5th	median	95th	97th
16	7.3	7.9	**12.1**	16.5	20.1
17	7.7	8.3	**12.7**	19.4	21.1
18	8	8.7	**13.3**	20.2	22
19	8.3	9	**13.7**	20.7	22.5
20	8.6	9.3	**14.1**	21.2	23
21	8.8	9.5	**14.3**	21.4	23.3
22	8.9	9.7	**14.5**	21.6	23.5
23	9	9.8	**14.6**	21.8	23.7
24	9	9.8	**14.7**	21.9	23.8
25	8.9	9.7	**14.7**	22.1	24
26	8.9	9.7	**14.7**	22.3	24.2
27	8.5	9.5	**14.6**	22.6	24.5
28	8.6	9.4	**14.6**	22.8	24.9
29	8.4	9.2	**14.5**	23.1	25.4
30	8.2	9	**14.5**	23.4	25.8
31	7.9	8.8	**14.4**	23.8	26.3
32	7.7	8.6	**14.4**	24.2	26.9
33	7.4	8.3	**14.3**	24.5	27.4
34	7.2	8.1	**14.2**	24.8	27.8
35	7	7.9	**14**	24.9	27.9
36	6.8	7.7	**13.8**	24.9	27.9
37	6.6	7.5	**13.5**	24.4	27.5
38	6.5	7.3	**13.2**	23.9	26.9
39	6.4	7.2	**12.7**	22.6	25.5
40	6.3	7.1	**12.3**	21.4	24
41	6.3	7	**11.6**	19.4	21.6
42	6.3	6.9	**11**	17.5	19.2

FIGURE 9

Amniotic Fluid Index Values (Mm) for normal pregnancy (Percentile Values)

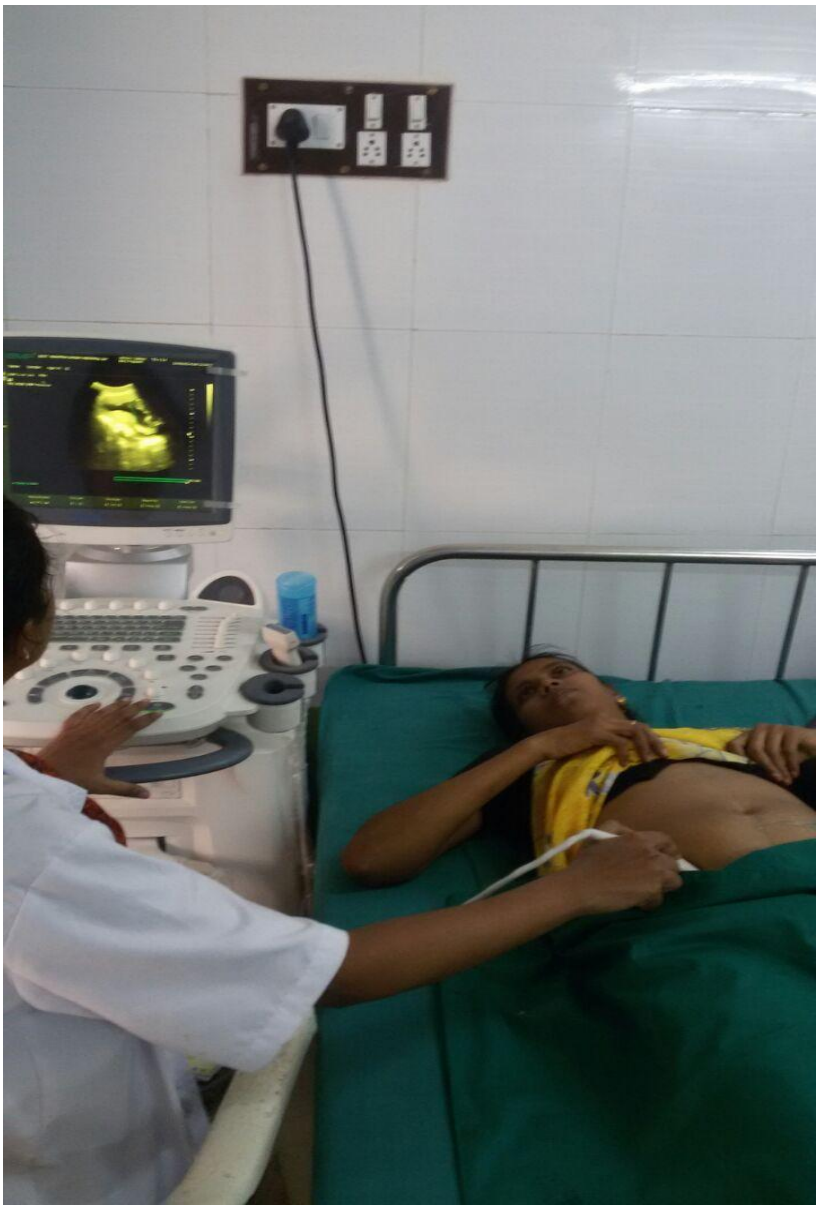
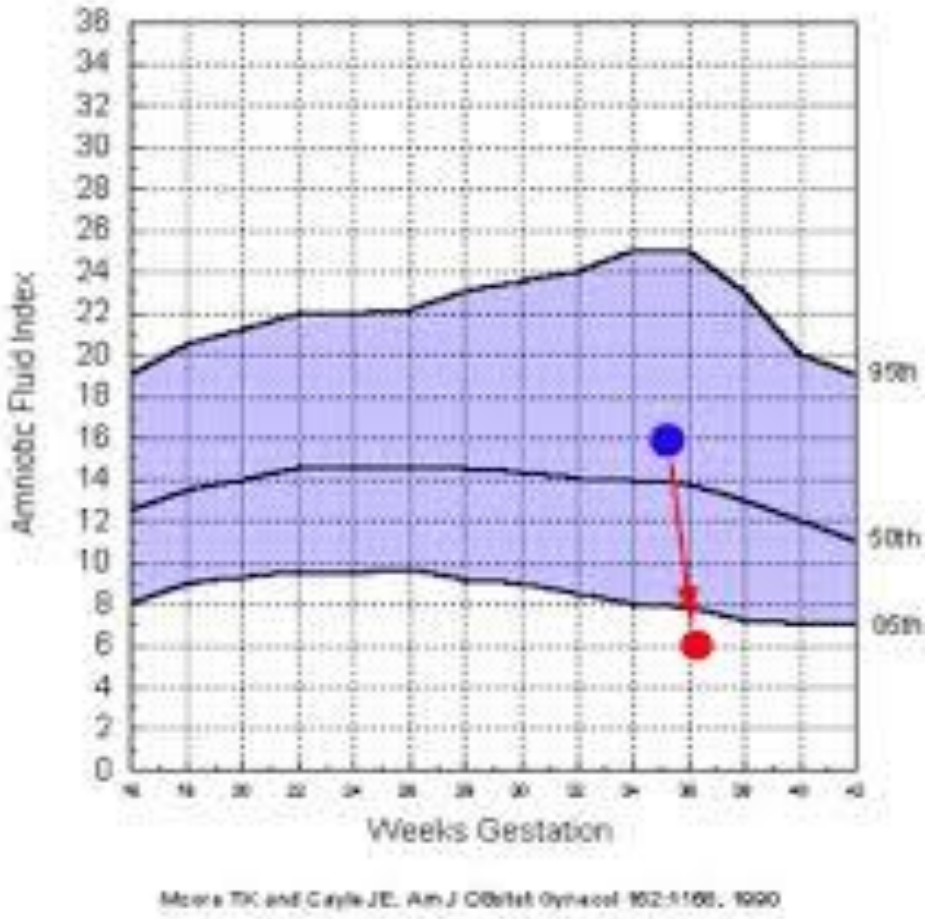


FIGURE 10

Four-Quadrant measurement of Amniotic fluid

FIGURE 11

Amniotic Fluid Index measured in cm with respect to gestation age in weeks



Moore TR and Cayle JE. Am J Obstet Gynecol 162:1168, 1990

BORDERLINE AMNIOTIC FLUID INDEX

Amniotic fluid volume more than two standard deviations below the mean for the gestational age is defined as oligohydroamnios. Borderline amniotic fluid index is AFI between 5 to 8 cm as per Phelan et al [16]

Various authors give different definitions for AFI

REFERENCES	TECHNIQUE	DEFINITIONS
MANNING ET AL. (1981)	USG	MVP<1 CM
HALPERVIN ET AL. (1985)	USG	MVP<3 CM
PHELAN ET AL. (1987)	USG	AFI<5 CM
BRACE AND WOLF (1989)	DIRECT/DYE DILUTIONS	318 ML
MANNING ET AL. (1990)	USG	MVP < 2 CM
MOORE ET AL. (1990)	USG	MVP<5TH PERCENTILE
JENG ET AL. (1992)	USG	AFI<8CM
MAGANN ET AL. (1992)	USG	TWO DIAMETER POCKET VERTICAL X HORIZONTAL < 15 CM^2
HORSANGER ET AL.	DYE DILUTION	200 ML
MAGANN ET AL. (1992)	DYE DILUTION	500 ML

INCIDENCE:

Incidence of oligohydramnios is about 0.5% to 5%. The incidence increases in post term pregnancies to 11%[25]. In RADIUS[26] trial conducted in 15000 patients screened with usg found 1.5% incidence of oligohydramnios and 0.8% in control group

ETIOLOGY:

Generally grouped into

1) Early onset
2) Late onset

Conditions which are commonly associated with Oligohydramnios

Early onset

1) Chromosomal abnormalities
2) Congenital anomalies
3) Ruptured membranes
4) Fetal demise
5) Following amniocentesis or chorionic villous sampling
6) Twin to twin transfusion
7) Prostaglandin synthetase inhibitors
8) Angiotensinogen converting enzyme inhibitors

Late onset

1) Placental insufficiency
    i. Hypertension
    ii. Preeclampsia
    iii. Diabetes
    iv. Hypovolemia
2) Abruption
3) Ruptured membranes.

RUPTURED MEMBRANES

The most common cause of oligoamnios well differentiated by the history of leaking PV

FETAL ABNORMALITIES

Anomalies of renal tract and genitor-urinary tract results in oligoamnios with incidence of 7-37%

VARIOUS FETAL ABNORMALITIES ASSOCIATE ARE

Genitourinary:

A) Renal agenesis (33-57%)

Urethral obstruction

Bladder exostrophy

Prune belly syndrome

B/L multicystic dysplastic kidney

Meckel-Gruber syndrome

Pelviureteric junction obstruciton

B) Non renal

1. Cardiac : Congenital heart block

   Fallots tetralogy

   Septal defects

2. Hypothyroidism

3. Skeletal : Sirengomelia

   Sacral agenesis

   Absent radius

   Facial clefting

4. CNS : Holoprosencephaly,

   Meningocoele Encephalocoele,

   Microcephaly

5. Cloacal dysgenesis

6. Cystic hygroma

7. Diaphragmatic hernia

8. TRAP (Twin reverse arterial perfusion) sequence.

   And Twin-Twin transfusion.

9. VACTERL (Vertebral, anal, cardiac, tracheo

   esophageal, renal, limb)

OLIGOHYDRAMNIOS IN LATE PREGNANCY:

- Increased risk for adverse perinatal outcome
- Increased risk for operative deliveries
- Increased incidence of meconium staining of liquor, fetal distress.

Diagnosis:

Oligohydramnios is said to be present when AFV < 400 ml after mid trimesters. Clinically oligohydramnios is suspected when; Uterine size is smaller for the gestational age and Uterus feels full of fetus. The diagnosis of oligohydramnios is confirmed by ultrasonography.

Subjective sonographical criteria

1. Obvious lack of amniotic fluid
2. A poor fluid- fetal interface
3. A marked crowding of fetal parts & uterus moulded to the fetus
4. Uterine contour round & firm as opposed to the usual oval & flexible.

Semi – quantitative methods

1. MVP : Manning et al defined oligohydramnios when MVP <1 cm
2. AFI : Phelan described oligohydramnios when AFI < 5 cm and AFI < 8 cm it was considered as borderline reduction

3. Two – diameter pocket : A two diameter pocket of < 15 cm^2

Evaluation of oligohydramnios should include:

1. Assessment for rupture of membranes
2. Targeted ultrasound for fetal anomalies
3. Ultrasound to assess for intra uterine growth restriction
4. Amniocentesis for intra uterine growth restriction
5. Amniocentesis for chromosome analysis
6. Maternal antinuclear antibody, anticardiolipin antibody and lupus anticoagulant
7. Kleihauer – Betke count

Oligohydramnios detected in late pregnancy can be assessed and supportive measures can be taken according to the cause. For example PROM can be treated with antibiotic and amnioinfusion to reduce fetal distress and maternal hydration is supported which can increase the amniotic fluid proved by Kilpatrick[27] studied that hydration of mother with 2L of fluid intake increased the AFV by 30% in decreased amniotic fluid. But in chronic oligohydramnios with severe IUGR it doesn't help.

Studies in administering fetal frusemide which increases the fetal urine output increasing the AFV and Subtotal immersion in water by 24inches in 34degree water for 30 minutes once or twice daily increased the AFV are there.

FETAL SURVEILLANCE

Antepartum and Intrapartum surveillance of fetus in low risk pregnancies with isolated oligohydramnios help to detect the fetal distress earlier and delivery is considered in distress cases earlier to save the infant.

Various methods in fetal surveillance are:

1. Fetal movement test : by maternal perception and tocodynamometer
2. Daily fetal movement count: charting the fetal movement count daily can account for abnormal fetal behavior with decreased movements
3. Non-StressTest(NST): antenatally the fetal heart rate tracings are recorded in corresponding with uterine contractions and fetal movements. With each fetal movement rise in fetal heart rate from baseline to 15 -20 beats lasting for 15 -20 seconds is considered accelerations and two such acceleration in 20 minutes considered Reactive NST. Can be extended to 80 to 120 min if suspected sleep pattern and observed to reduce Non-Reactive NST by 50%[(28)]

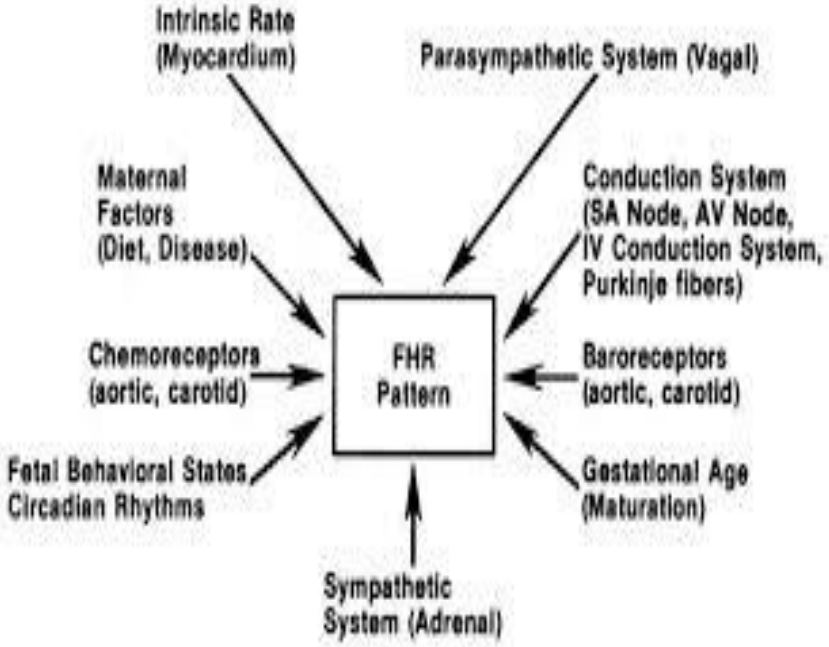


FIGURE 12

Physiology behind non-stress test

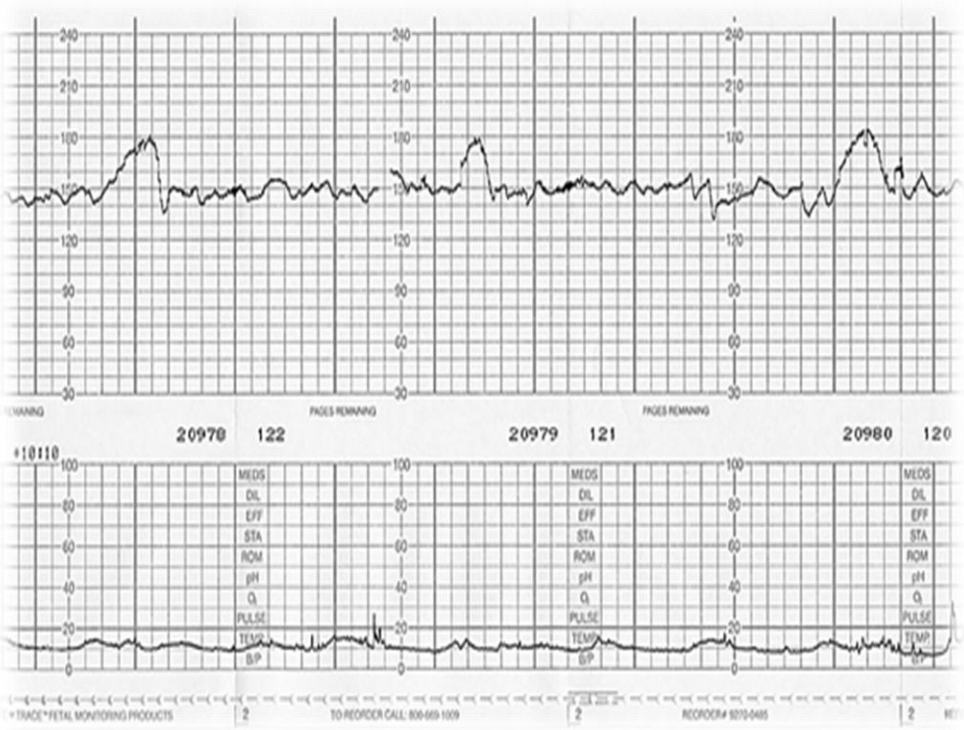


FIGURE 13

Fetal heart tracings – Reactive NST

4. Biophysical profile: Manning et al studied the fetal behavior by five parameters which assessed the fetal well-being by the fetal CNS,Skeletal, Sympathetic, Parasympathetic pathways integrity.
5. Modified biophysical profile : takes into account amniotic fluid index and NST.
6. Contraction stress test: oxytocin infusion is given and FHR pattern is observed. Positive CST indicates early delivery.
7. Fetal Acoustic Stimulation Test(FAST)[29]: stimulating the fetus with acoustic stimulus induces the fetal reactivity and makes the non-reactive NST into Reactive NST.
8. Visual Acoustic Stimulation Test(VAST)[30]: Monitoring the fetal movements by ultrasound with acoustic stimulation. Detects the acute and chronic markers of utero-placental insufficiency.
9. Doppler velocimetry:

Umbilical artery velocimetry is most commonly used. An S/D ratio more than 95th percentile for gestational age, absent or reversed end diastolic flow signifies increased impedance and is associated with fetal growth restriction. Absent or reversed end diastolic flow and umbilical venous pulsations have a grave prognosis for fetus, as reported by Zelop and colleagues (1996) the PNM rate for reversed end diastolic flow is 33% and for absent diastolic flow is 10%[31]

Scoring criteria for biophysical profile (Manning 1995)[32]

Biophysical variable	**Normal (score=2)**	**Abnormal (score=0)**
Fetalbreathing movements	1 episode of atleast 30sec in 30 min	Absent or no episode>30sec in 30 min
Fetal movements	3 discrete body/limb movements in 30 min	2 or less in 30 min
Fetal tone	1 episode of active extension with return to flexion of limbs or trunk	Slow extension with return to partial flexion or no movement
Amniotic fluid	1 pocket measuring atleast 2 cm in two perpendicular planes	Either no pocket or pocket <2cm in two perpendicular plane
Non-stress test	Reactive	Non reactive

INTRAPARTUM FETAL MONITORING

Various methods have been used for fetal monitoring during labour like intermittent auscultation, cardiotocography, fetal stimulation tests, fetal scalp blood pH, umbilical blood gas analysis, intrapartum Doppler, fetal ECG and pulse oximetry.

Cardiotocography

Electronic fetal heart rate monitoring can be done by either internal or external electrodes. The fetal heart rate is studied for baseline rate, variable accelerations and decelerations and tocography includes, frequency of contractions, contractions strength, fetal movements and maternal pushing movement.

The NICHD (National Institute of Child Health and Human Development) fetal monitoring workshop 1997 has proposed standardized unambiguous definitions for interpretation of fetal heart rate pattern.

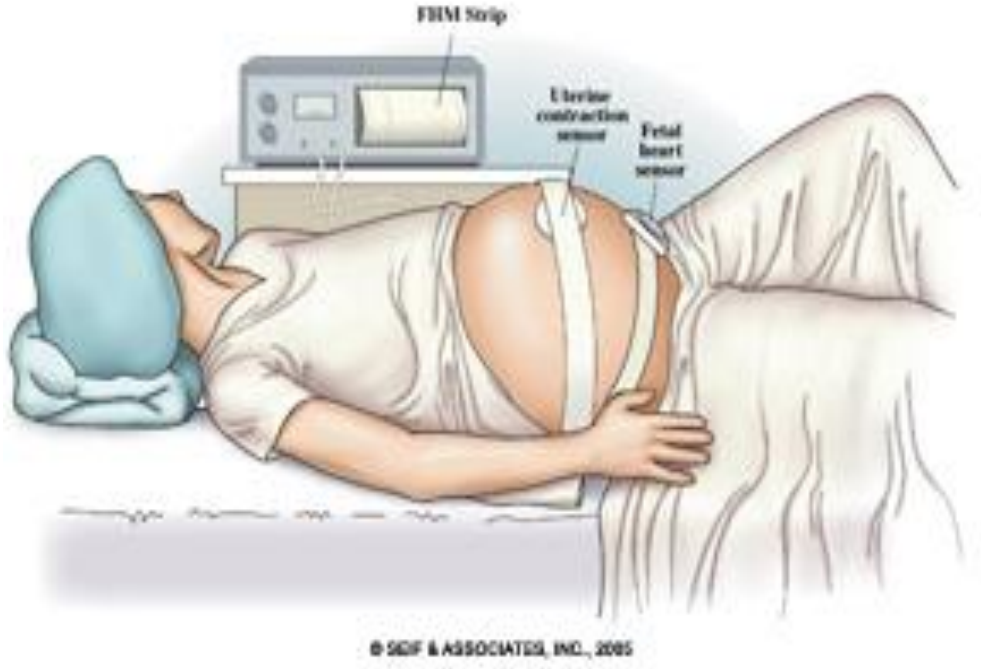


FIGURE 14
Pictorial representation of method of CTG

Rate

A rate of 120-160 bpm is generally considered to be normal. Baseline FHR less than 110 bpm is considered as bradycardia though lower normal limit is controversial. FHR between 100-120 bpm in the absence of other changes is not usually considered to represent fetal compromise and often attributed to head compression in occipitoposterior and transverse positions. Severe bradycardia (< 80 bpm) may be due to hypothermia, prolonged hypoglycemia, β blocker, congenital heart block, conduction analgesia. Tachycardia is said to be present if FHR > 160 bpm which could be due to fetal hypoxia, fetal anemia, fetal heart failure, amnionitis. This signifies fetal compromise only in presence of concomitant decelerations.

Variability

The oscillation of baseline fetal heart rate from beat-to-beat as a result of sympathetic and parasympathetic interactions which is recorded as irregularities on the graph paper is called baseline variability.

Short term variability : is a measure of interval between cardiac systoles and reflects instantaneous changes in fetal heart rate from one beat-to the next.

Long term variability : Describes oscillatory changes that occur during 1 min and results in waviness of FHR tracing at frequency of 3-5 cycles per min.

Periodic changes Acceleration : An increase in FHR of 15 bpm for 15-20 sec. It represents fetal alertness or arousal state. It is a reassuring pattern.

Decelerations

Early deceleration: it begins early in uterine contractions and nadir occurs at peak of contractions and returns to baseline before completion of contraction. This is usually due to head compression and also has been associated with fetal hypoxia or acidosis.

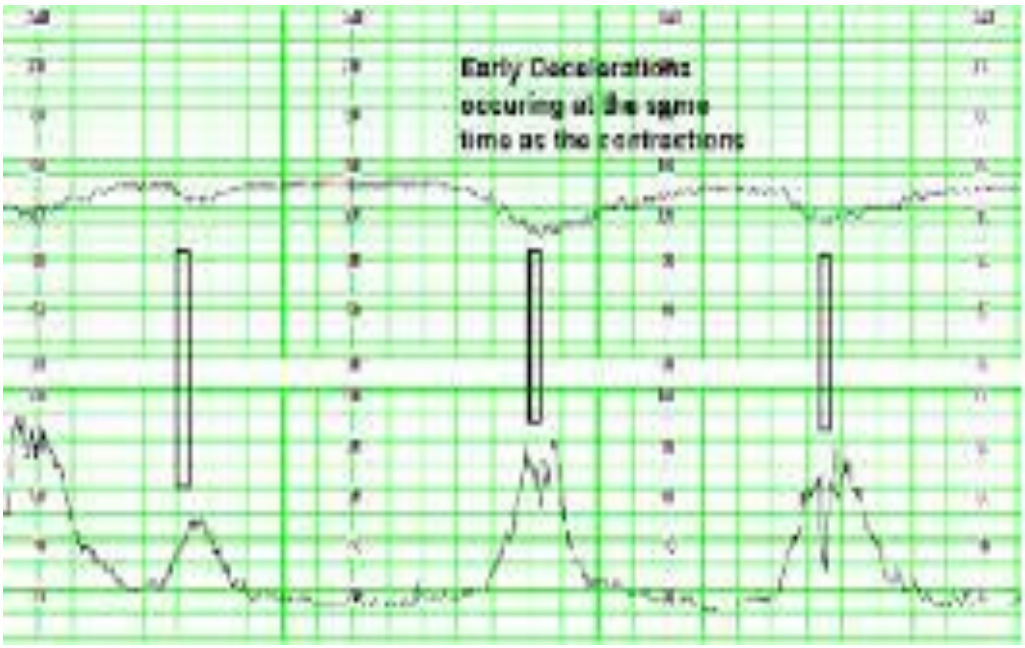


FIGURE 15

Early deceleration

Late Deceleration: It is a smooth gradual symmetrical decrease in FHR beginning at or after the peak of the uterine contraction and returns to baseline only after the contraction has ended.

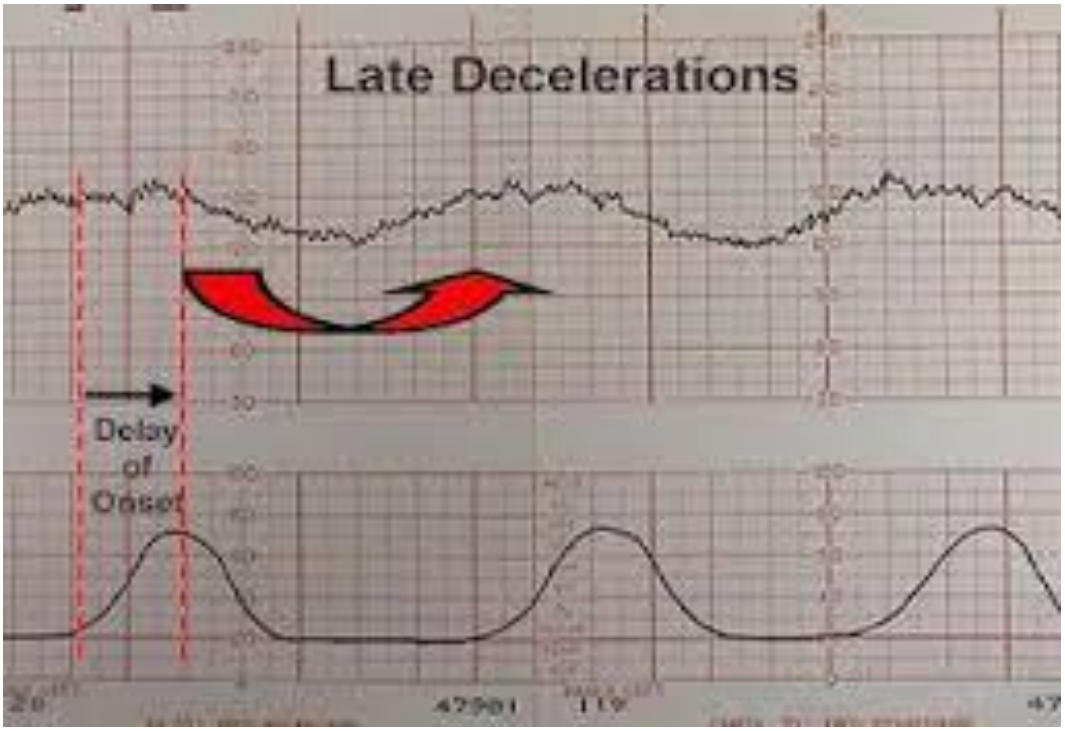


FIGURE 16

Late deceleration – 1

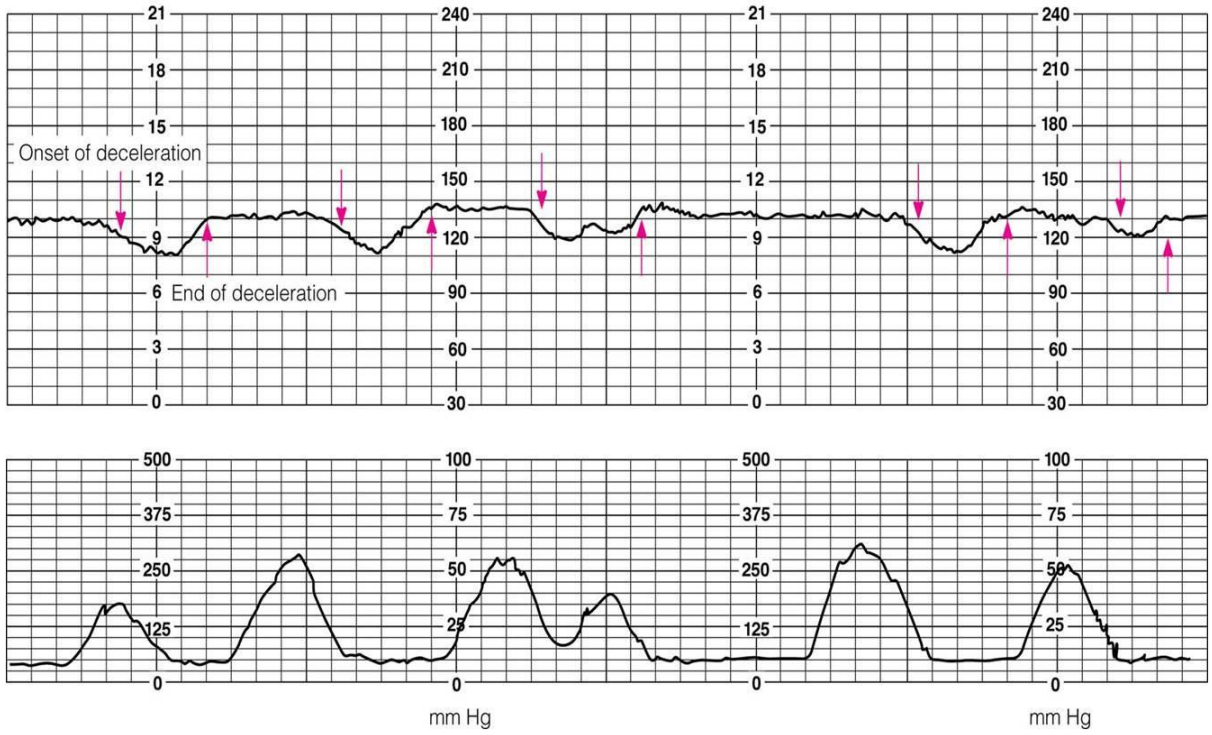


FIGURE 17

Late deceleration - 2

Variable deceleration: It is the most common deceleration pattern encountered during labour, defined as visually apparent abrupt decrease in rate, onset varying with successive contractions. Often it is due to cord compression. Variable deceleration may have shoulder of acceleration before and after the deceleration or may have abrupt deceleration. This variation is caused by varying degree of cord occlusion. Occlusion of only the vein reduces the fetal blood return which triggers baro receptor mediated acceleration. Subsequent complete occlusion results in fetal systemic hypertension due to obstruction of umbilical artery. This stimulates baroreceptor mediated decelerations. The after coming shoulder of accelerations represents same event in reverse. The ACOG (1995) has defined significant variable deceleration as those less than 70 bpm and lasting for more than 60 sec[33]

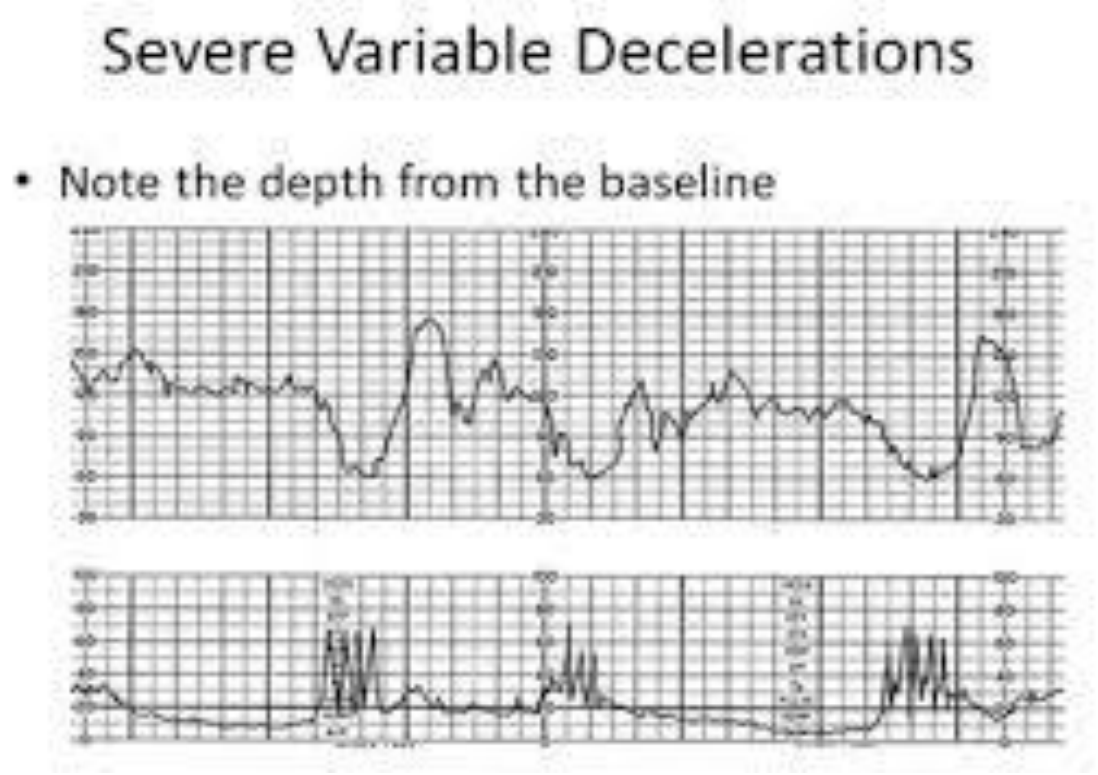


FIGURE 18

Variable deceleration

Prolonged Decelerations : Defined as isolated decelerations lasting more than 2 min but less than 10 min. Some of the common causes include uterine hyperactivity, cord entanglement, supine hypotension, cervical examination and epidural analgesia.

Sinusoidal heart rate : A sinusoidal pattern of fetal heart rate has a stable baseline heart rate of 120-16 bpm, amplitude of 5-15 bpm, fixed or flat short term variability, oscillation of sinusoidal waveforms above or below the baseline and absence of accelerations. These have

been observed in serious fetal anemia of any cause, also in meperidine and morphine therapy, fetal distress and umbilical cord compression.

METHODOLOGY

METHODOLOGY

PLACE OF STUDY:

Study conducted in Mahatma Gandhi Memorial Government Hospital, attached to K.A.P.Viswanatham Government medical college, Trichy.

STUDY PERIOD:

August 2012 to April 2014

STUDY DESIGN:

Observational Cohort Study

SAMPLE SIZE:

50 in study group and 50 in control group

STUDY GROUP:

Antenatal women admitted with borderline AFI 5 to 8cm with singleton pregnancy who have completed 37weeks with intact membrane

CONTROL GROUP:

Antenatal women with Normal AFI 8to 24cm admitted Inpatients

SAMPLING PROCEDURE:

Patients admitted as Inpatients in Obstetrics and Gynaecology Department in Mahthma Gandhi Memorial Government Hospital were

selected as per inclusion and exclusion critetria and categorized into study and control group respectively

INCLUSION CRITERIA:

1. Single live intrauterine gestation with cephalic presentation
2. AFI from 5 to 8 cm
3. 37 completed weeks of gestation
4. Intact membrane

EXCLUSION CRITERIA :

1) AFI less than 5 and more than 8

2) Gestational age less than 37 completed weeks.

3) Post term

4) Associated fetal malformations.

5) Ruptured membranes

6) Malpresentation and multiple gestations.

7) High risk pregnancy eg:

1) Placental insufficiency

a. Hypertension

b. Preeclampsia

c. Diabetes

d. Hypovolemia

e. chronic renal disease

f. connective tissue disorders

2) Abruption

3) Prostaglandin synthetase inhibitors therapy

4)Angiotensinogen converting enzyme inhibitors therapy

The pregnancies with fetal malformations were also excluded from the study

PROCEDURE:

All patients both in study group and control group are informed about the condition and informed written consent were obtained after explaining the procedure ,their AFI, and absence of adverse effects in the study with ensurance that their fetus will be monitoring all the time and no adverse effect will be on fetus. Detailed history was elicited and recorded. General examination ,Systemic examination and Obstetric examination was carried. Investigated for urine routine, Hb, Blood grouping and typing,Random blood sugar, BT,CT were done.Ultarsonogram was done and documented.

On admission NST is done for all women in both case and control groups.

If NST found reactive, then further management is done according to protocol and if non reactive Emergency LSCS done (not if patients is in active labour who will deliver immediately)

If patient is in labour (ie less than 3 cm in primigravida and less than 4 cm in multigravida are included in study), oxytocin drip started at the rate of 8 drops per minute. Women if not in labour Bishops scoring done . Start oxytocin if cervix is favourable. Induce with Dinoprostone gel in case of unfavourable cervix .Reassess the Bishops score after 6 to 8 hrs of instillation. If in labour, start oxytocin drip. If not in labour watch for another 6 to 8 hrs .Case will be taken for emergency LSCS if no progress.

All cases will be monitored by CTG in labour. Any signs of fetal distress emergency LSCS done.

After 3 centimeter dilatation of the cervical os in primigravida and 4 cms dilatation in multigravida ARM done and will be classified as clear and meconium stained liquor. Cases with meconium stained liquor will be taken for emergency LSCS.

All new borns will be attended by Pediatrician.

Various outcome measures recorded are induced vs spontaneous labour, nature of amniotic fluid, FHR tracings, mode of delivery, indication for caesarean section or instrumental delivery, APGAR score at 1 minutes and 5 minutes, birth weight, admission to neonatal ward, perinatal morbidity and mortality.

Statistical Analysis

The observed data's were analyzed by SPSS version 21.0 software. The collected data were tabulated and expressed as mean, standard deviation, numbers and percentages. Continuous variables were compared with one way ANOVA. The comparison was done using Chi-Square as appropriate value reported at the 95% confidence interval. p value <0.05 was considered as statistically significant.

OBSERVATIONS RESULTS AND ANALYSIS

TABLE – 1

AGE DISTRIBUTION

AGE	Study(n=50)		Control(n=50)	Total(n=100)		Statistical difference
Below 20yrs	7	(14%)	10 (20%)	17	(17%)	X^2=2.329 df=2 .312>0.05 Not Significant
21 to 30yrs	39	(78%)	39 (78%)	78	(78%)	
Above 30yrs	4	(8%)	1 (2%)	5	(5%)	

In this study 17 patients were below 20 years ; 78 patients were between 21 to 30 years; and 5 patients were above 30 years. Applying chi-square test there is no statistical difference between the study and control group. P value is o.312>0.05 which is insignificant.

CHART – 1

AGE

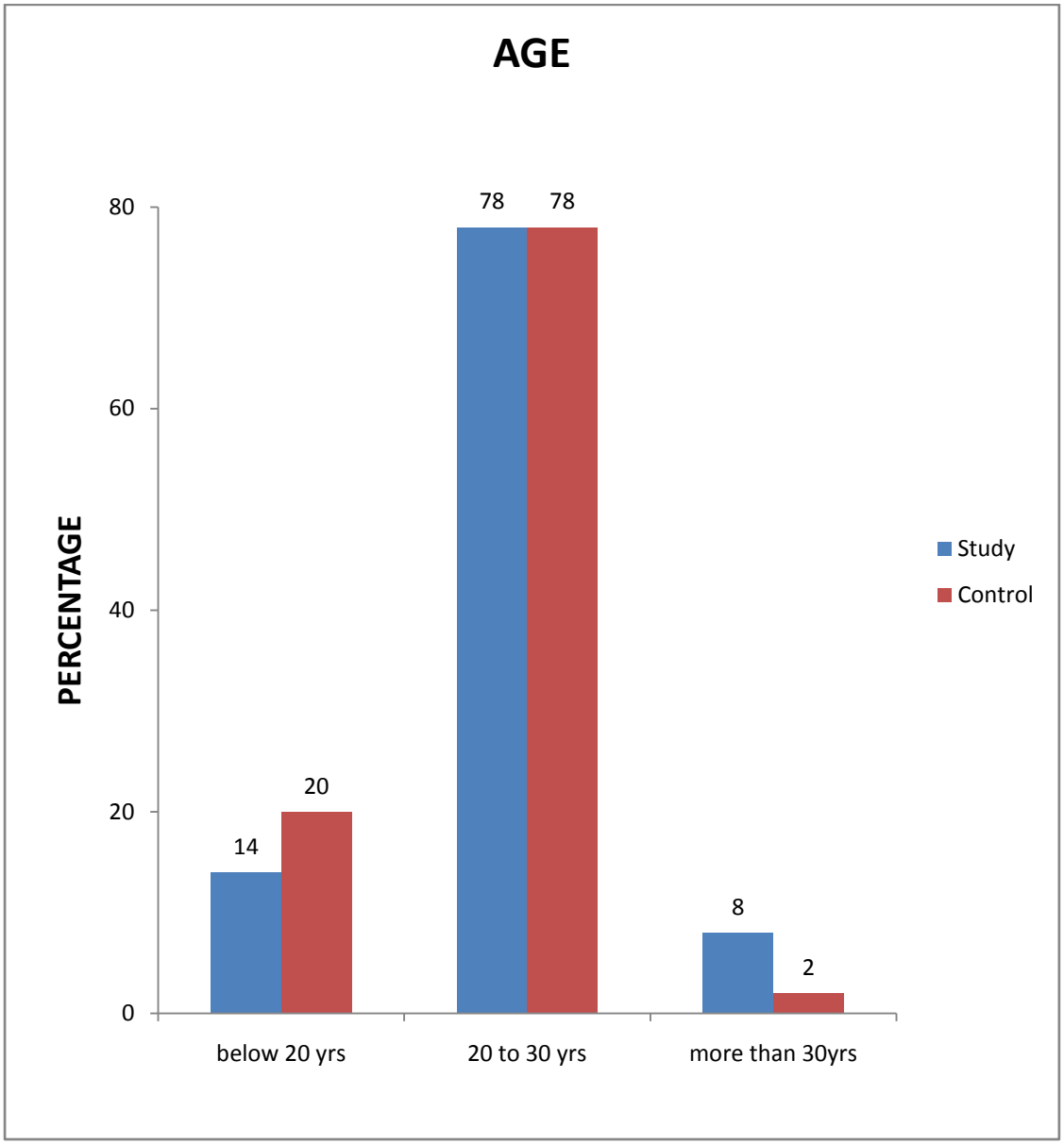

AGE
80
60
40
20
0
PERCENTAGE
78
78
20
14
8
2
Study
Control
below 20 yrs
20 to 30 yrs
more than 30yrs

TABLE – 2

PARITY

Obstetric Code	Study(n=50)	Control (n=50)	Total(n=100)	Statistical difference
Primi	28(56%)	30(60%)	58(58%)	X^2=1.693 df=3 .638>0.05 Not Significant
G2	17(34%)	13(26%)	30(30%)	
G3	5(10%)	6(12%)	11(11%)	
G4	0	1(2%)	1(1%)	

Comparing the parity both groups are comparable as there is no statistical difference. 58 patients were Primigravida, 30 patients were second gravida , 11 patients were third gravida, 1 patient was fourth gravid. Applying Chi-square test which showed a P value 0.638 >0.05 which is insignificant.

CHART – 2

PARITY

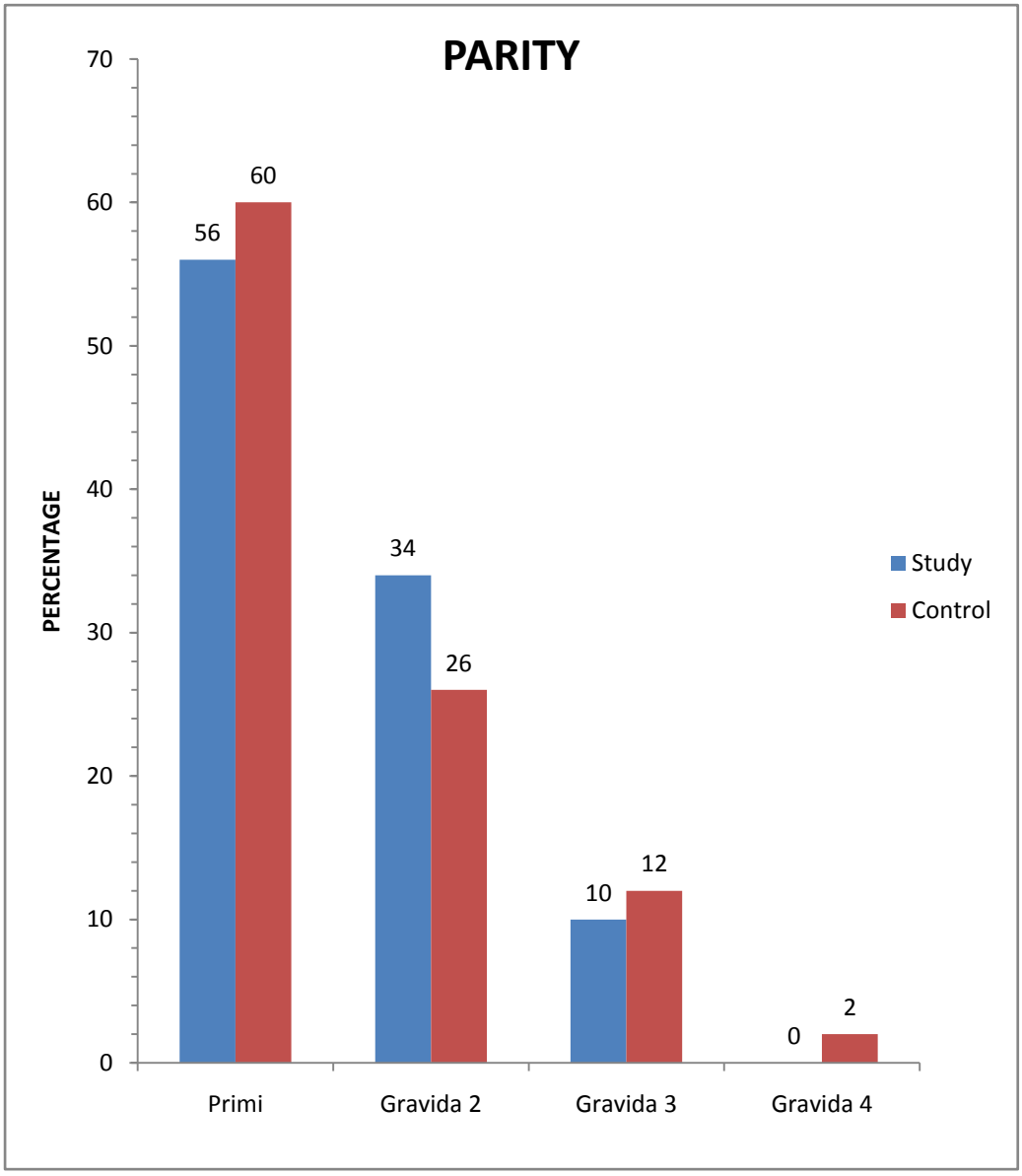


TABLE – 3

GESTATIONAL AGE

Gestational Age (weeks)	Study(n=50)	Control (n=50)	Total(n=100)	Statistical difference
37	6(12%)	6(12%)	12(12%)	X^2=1.105 df=3 .776>0.05 Not Significant
38	16(32%)	12(24%)	28(28%)	
39	13(26%)	17(34%)	30(30%)	
40	15(30%)	15(30%)	30(30%)	

In this study out of 50 patients 6, 16, 13 and 15 belong to Gestational age of 37,38,39 and 40 weeks respectively and 6, 12, 17 and 15 patients belong to 37, 38,39 and 40 weeks of gestation respectively. The P value is 0.776>0.05, which is insignificant.

CHART 3

GESTATIONAL AGE

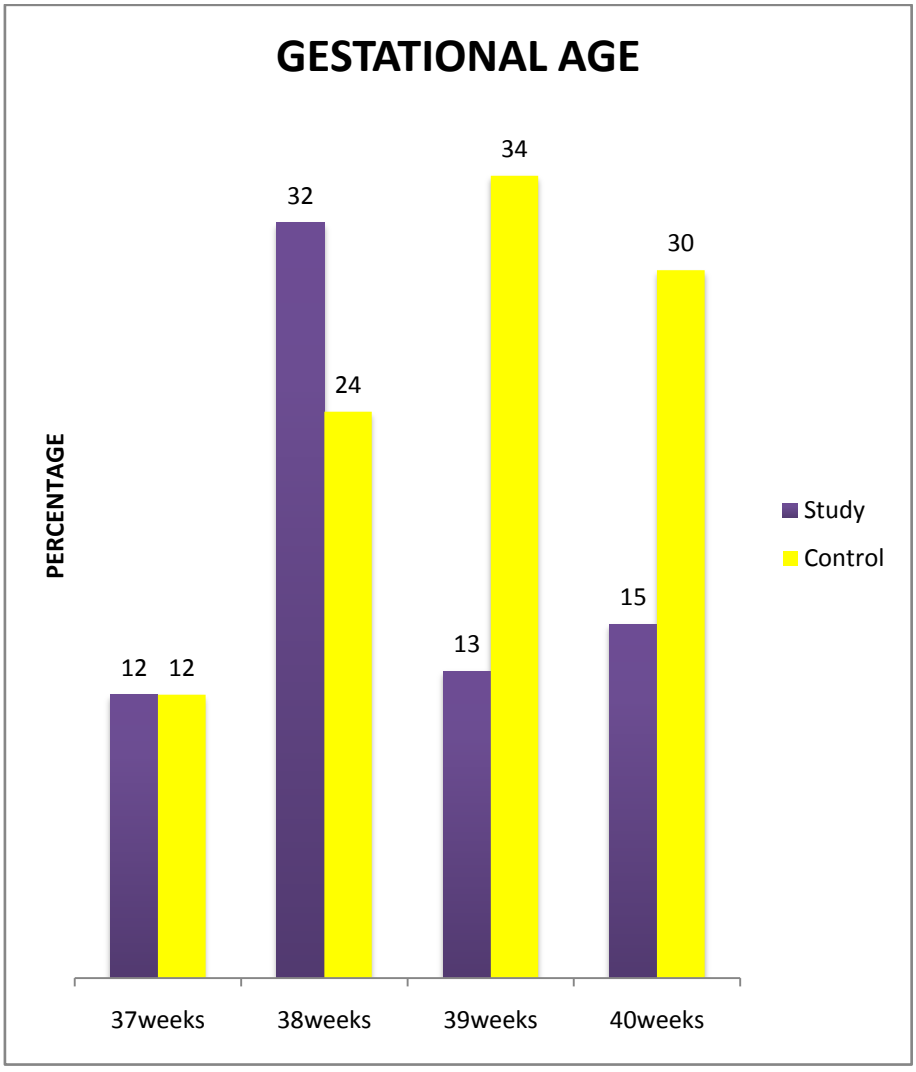


TABLE 4

AFI IN STUDY GROUP

AFI(in cm)	STUDY (n=50)
5	10(20%)
6	11(22%)
7	13(26%)
8	16(32%)

The distribution of study group in respect to Amniotic fluid index showed out of 50 patients 10 with AFI 5 cm, 11 with AFI 6 cm, 13 with AFI 7cm and 16 with AFI 8cm were there distributed as 20% , 22% , 26% and 32% of patients with AFI 5, 6, 7 and 8 cm respectively.

CHART 4

AFI IN STUDY GROUP

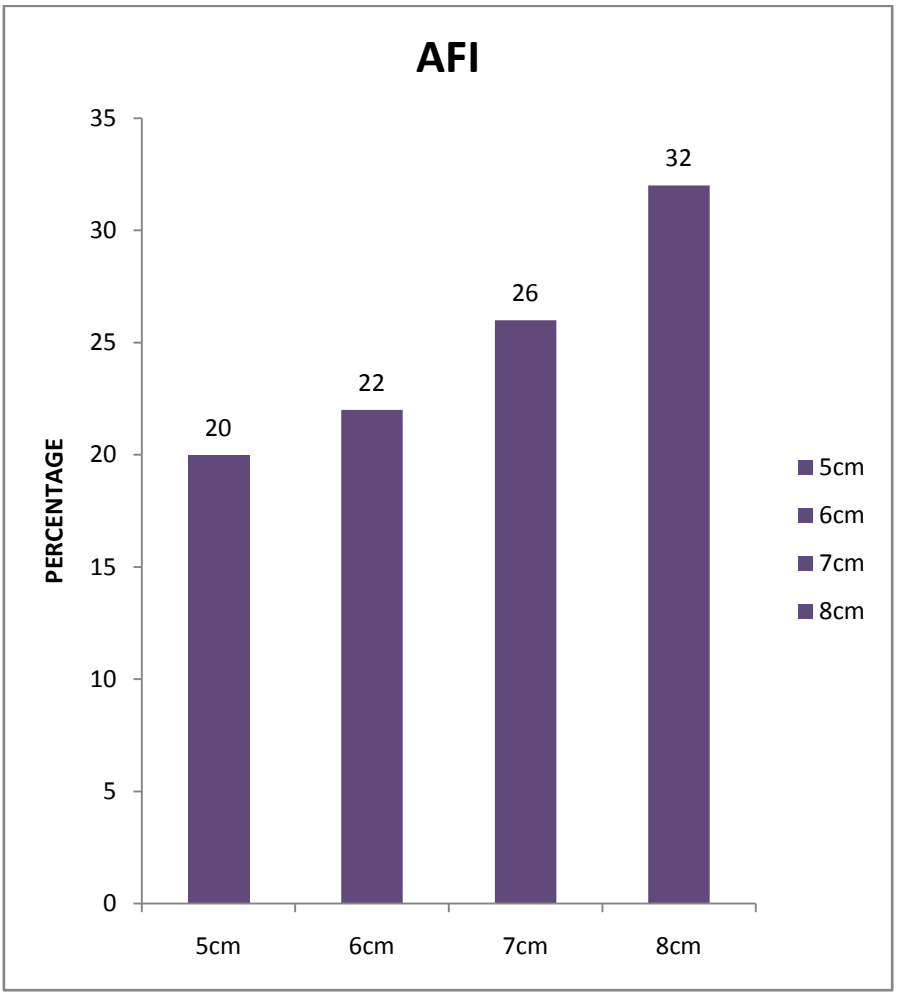


TABLE 5

AFI IN CONTROL GROUP

AFI (in cm)	**CONTROL(n=50)**	
9	12	(24%)
10	11	(22%)
11	10	(20%)
12	8	(16%)
13	4	(8%)
14	5	(10%)

Among the control group the distribution of patients was 12 with AFI 9cm ,11 with AFI 10cm, 10 with AFI 11cm, 8 with AFI 12cm, 4 with AFI 13cm, 5 with AFI 14cm with 24% , 22% , 20% , 16% , 8% , and 10% distribution of AFI 9, 10, 11, 12, 13 and 14cm.

CHART 5

AFI IN CONTROL GROUP

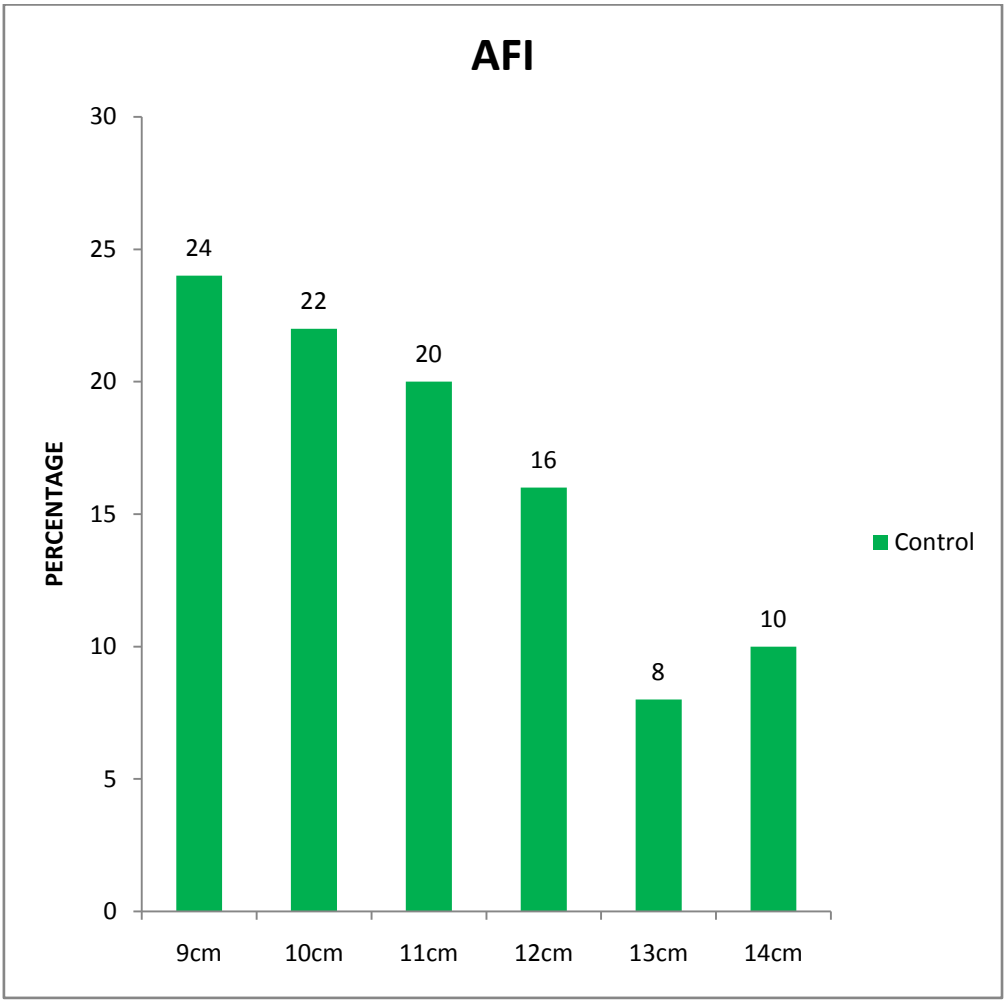


TABLE 6

NON STRESS TEST

NST	Study(n=50)	Control (n=50)	Total(n=100)	Statistical difference
Non-Reactive	27(54%)	15(30%)	42(42%)	X^2=5.911 df=1 .015<0.05 Significant
Reactive	23(46%)	35(70%)	58(58%)	

In this study, the tool used to monitor the patients was Non-Stress test which showed Non-Reactive test in 27 patients in study group and 15 patients in control group. Reactive test in 23 patients in study group 35 in control group. Applying Chi-square test the P value was 0.015<0.05 which is significant which implies that fetal distress is more among study group and signifies that with decreasing AFI perinatal risk increases.

CHART -6

NON STRESS TEST

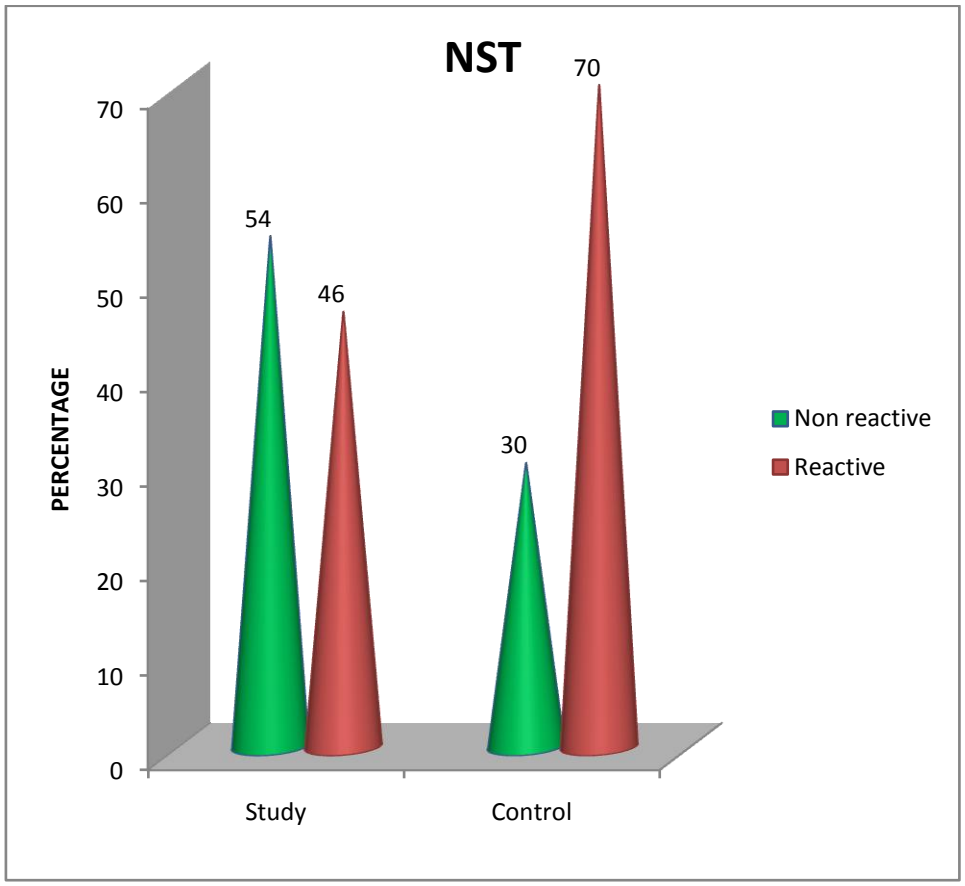


TABLE 7

FETAL HEART PATTERN

FH pattern	Study(n=50)	Control (n=50)	Total(n=100)	Statistical difference
Early Deceleration	6(23.1%)	6(40%)	12(29.3%)	X^2=1.989 df=2 0.021<0.05 Significant
Variable Deceleration	15(57.7%)	8(53.3%)	23(56.1%)	
Late Deceleration	5(19.2%)	1(6.7%)	6(14.6%)	

The fetal heart pattern had significant difference between two groups as variable deceleration and late deceleration are more in study group evident by 57.7% had variable deceleration and 19.2% had late decelerations. Chi-square test showed the P value of 0.021<0.05 which is significant indicates that with amniotic fluid reducing fetal distress increases.

CHART 7

FETAL HEART PATTERN

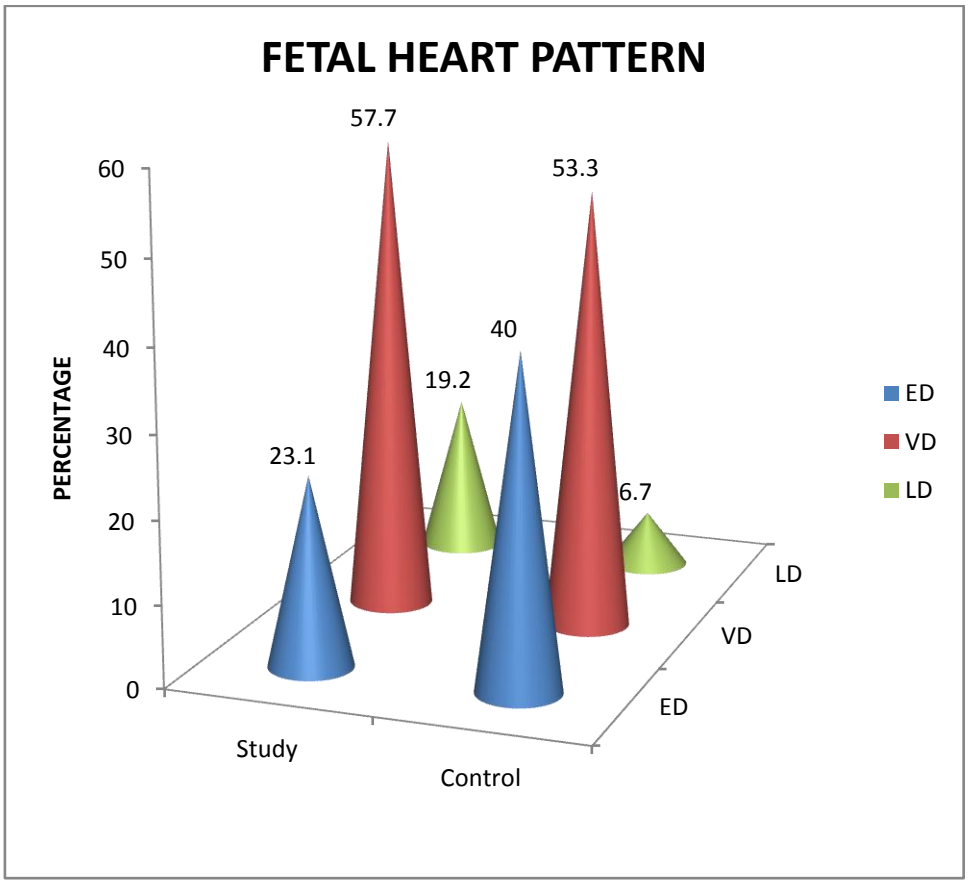


TABLE 8

ONSET OF LABOUR

Induced/ Spontaneous	Study(n=50)	Control (n=50)	Total(n=100)	Statistical difference
I	23(46%)	23(46%)	46(46%)	X^2=.000 df=1 1.000>0.05 Not Significant
S	27(54%)	27(54%)	54(54%)	

In this study comparing the onset of labour whether it is spontaneous or induced it was comparable as 46 patient were induced and 56 patient went into spontaneous labour with P value of 1.00>0.05 which is not significant.

CHART – 9

ONSET OF LABOUR

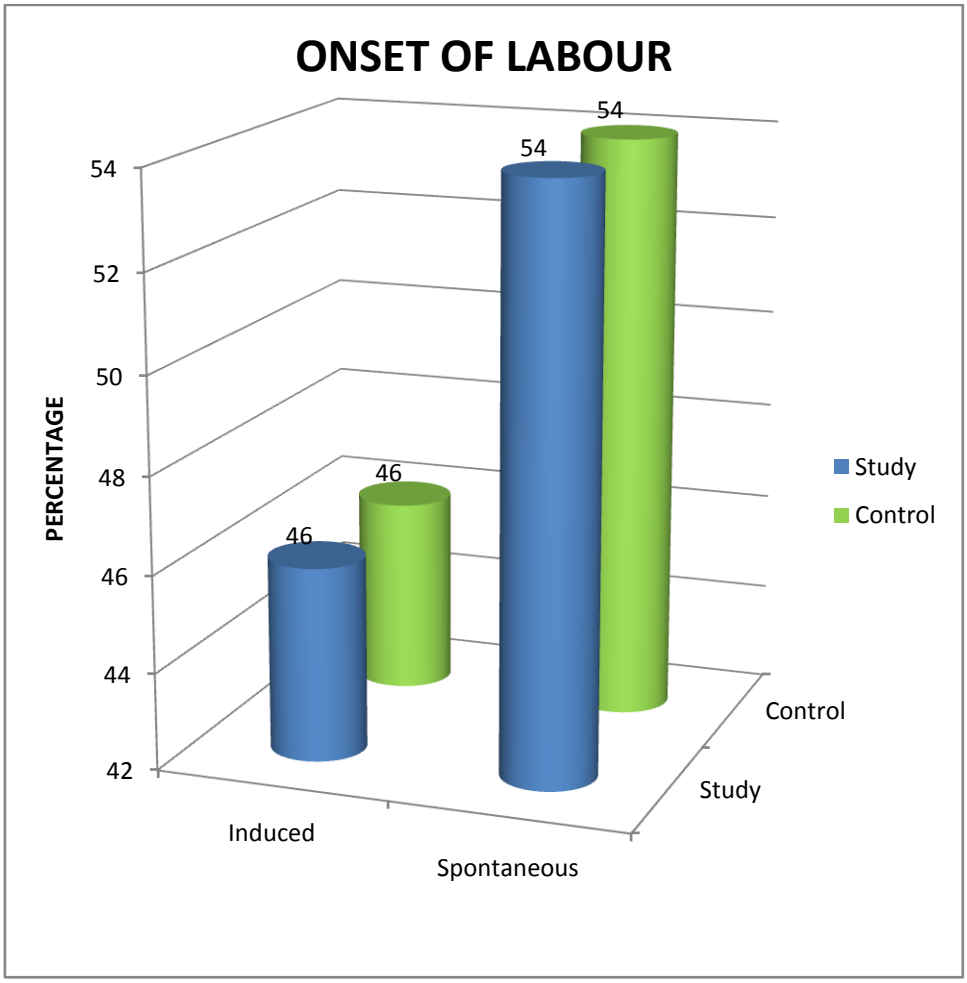


TABLE 9

MODE OF DELIVERY

MOD	Study(n=50)	Control (n=50)	Total(n=100)	Statistical difference
LSCS	28(56%)	24(48%)	52(52%)	X^2=.641 df=1 .423>0.05 Not Significant
LN/Epi	22(44%)	26(52%)	48(48%)	

The mode of delivery in this study showed that 52 patients delivered by caesarean section (LSCS) and 48 patients by Labour natural which had P value of 0.423 >0.05 which is insignificant. This implies the mode of delivery doesn't significantly differ with amniotic fluid index.

CHART 9

MODE OF DELIVERY

TABLE 10

INDUCTION DELIVERY INTERVAL

Induction delivery interval	**Study(n=50)**	**Control (n=50)**	**Total(n=100)**	**Statistical difference**
<12 hours	35(70%)	29(58%)	64(64%)	X^2=1.563 df=1 .211>0.05 Not Significant
>12hours	15(30%)	21(42%)	36(36%)	

The study showed there is no statistical difference in induction delivery interval among study and control groups as 64 patients delivered within 12 hours and 36 patients delivered more than 12 hours with Chi-square test showing P value of 0.211>0.05 which is insignificant.

CHART 10

INDUCTION DELIVERY INTERVAL

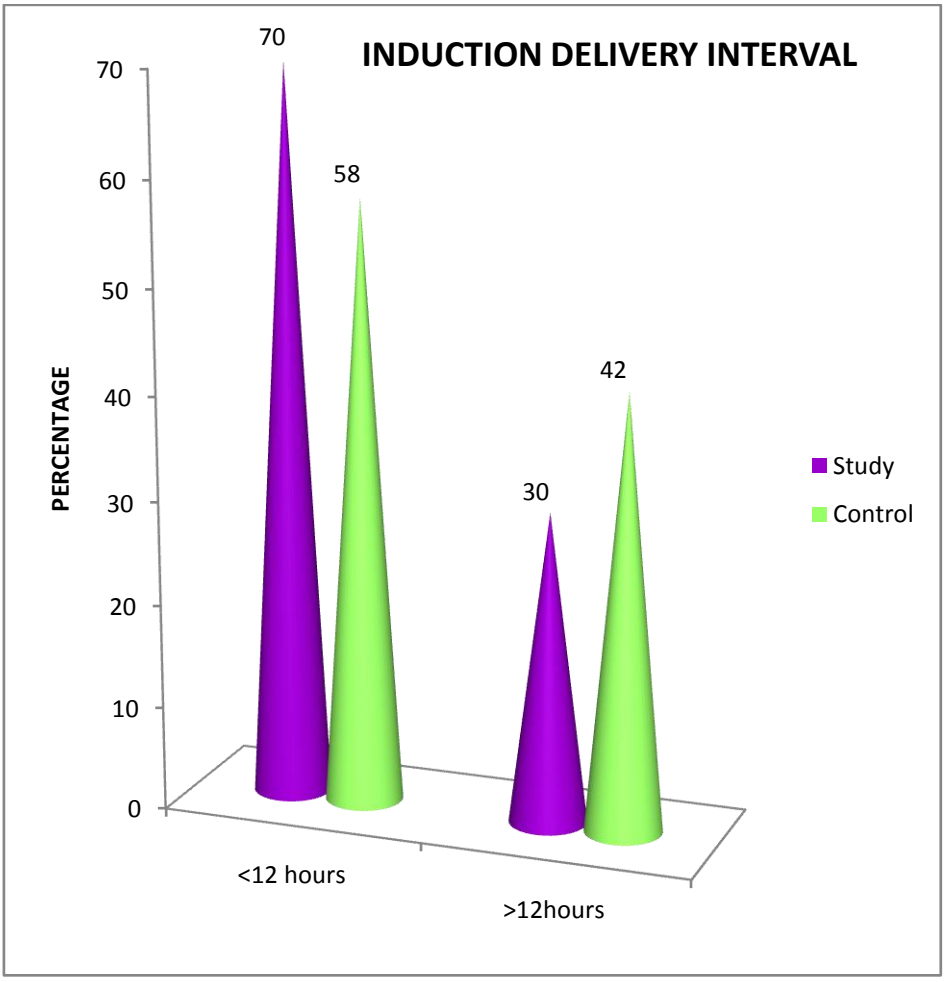


TABLE 11

AMNIOTIC FLUID NATURE

AF	Study (n=50)	Control (n=50)	Total (n=100)	Statistical difference
C	36 (72%)	42(84%)	78(78%)	X^2=2.098 df=1 .148>0.05 Not Significant
M	14(28%)	8(16%)	22(22%)	

The nature of amniotic fluid among study group was clear in 36 patients and meconium stained in 14 patients. Among control group 78 patients had clear amniotic fluid and 22 had meconium stained amniotic fluid. This is insignificant as the P value is 0.148>0.05 which signifies that the nature of amniotic fluid doesnot depend solely on AFI level but also on other factors too.

CHART 11

AMNIOTIC FLUID NATURE

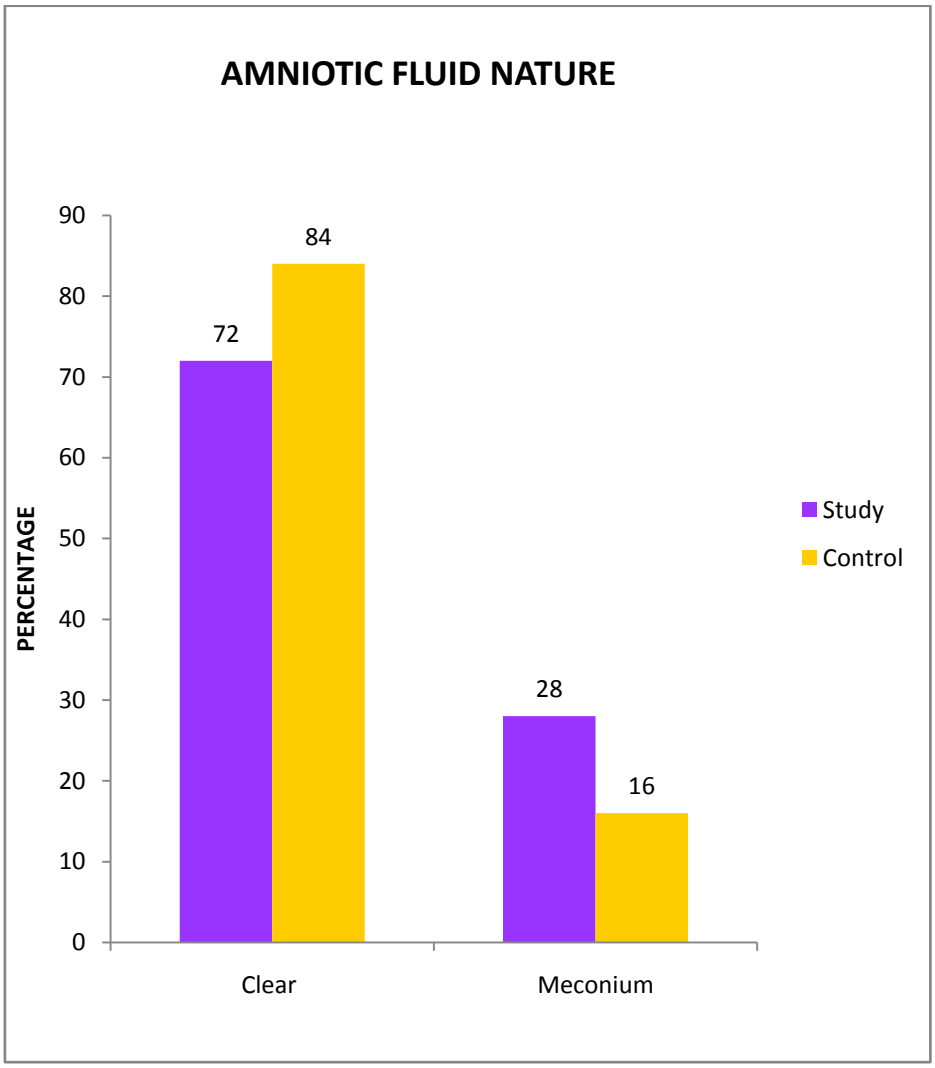


TABLE 12

BIRTH WEIGHT

B.Wt(kg)	Study(n=50)	Control (n=50)	Total(n=100)	Statistical difference
2 to 3 kg	36(72%)	37(74%)	73(73%)	X^2=.051 df=1.822>0.05 Not Significant
3 to 4 kg	14(28%)	13(26%)	27(27%)	

Birth weight data's showed no significant difference with P value of 0.822>0.05 as 73 patient had infants with birth weight between 2 to 3 kg and 27 patients had 3 to 4 kg babies.

CHART 12

BIRTH WEIGHT

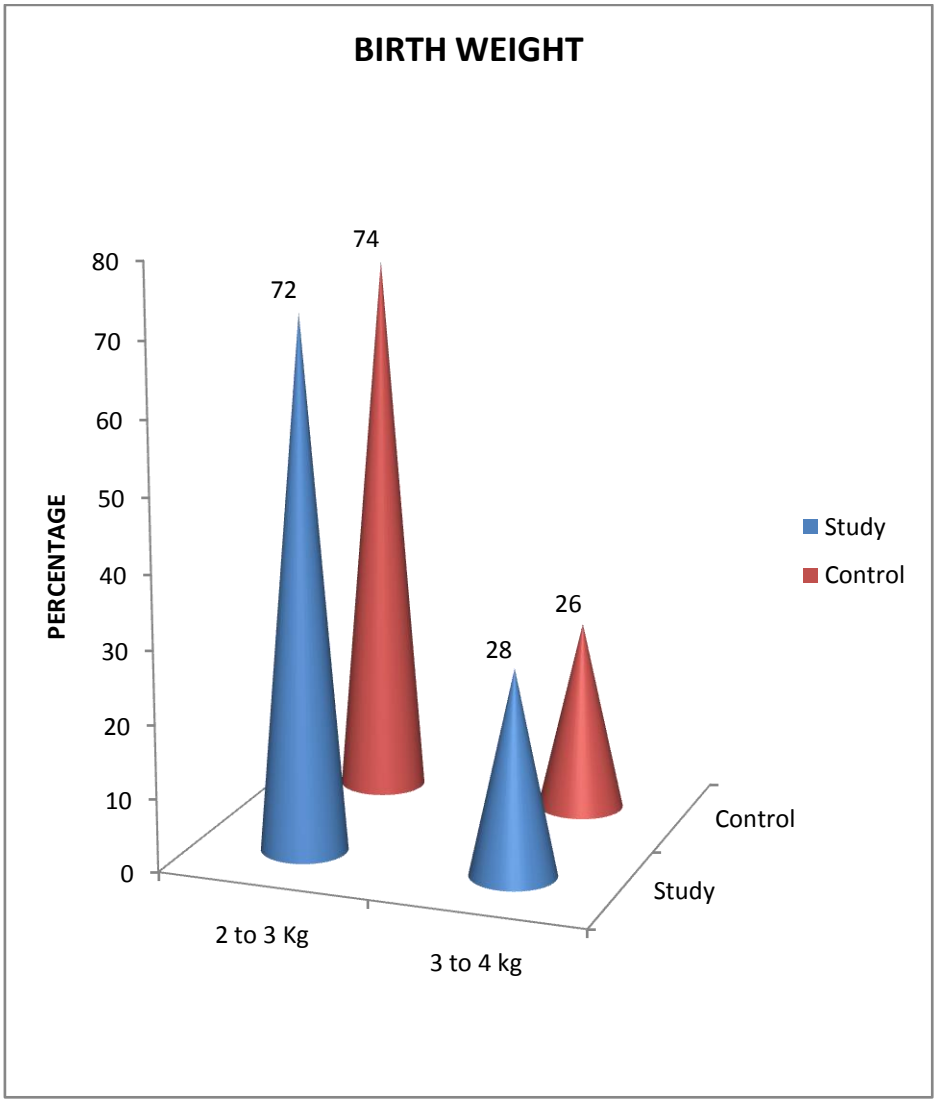


TABLE 13

MATERNAL EFFECT

Maternal effect	Study(n=50)	Control (n=50)	Total(n=100)	Statistical difference
No effect	36(72%)	35(70%)	71(71%)	X^2=.054 df=2 .973>0.05 Not Significant
Fever	12(24%)	13(26%)	25(25%)	
Paralytic ileus	2(4%)	2(4%)	4(4%)	

In this study the effect on mother in immediate postpartum period and postnatally / post operative period showed 71 mother had no effects, 25 patients had fever and 4 patient had paralytic ileus which was treated. On the whole there was no statistical difference as P value was 0.973 > 0.05 which signifies AFI solely doesnot affect the maternal outcome but other factors significantly lead into LSCS.

CHART 13

MATERNAL EFFECT

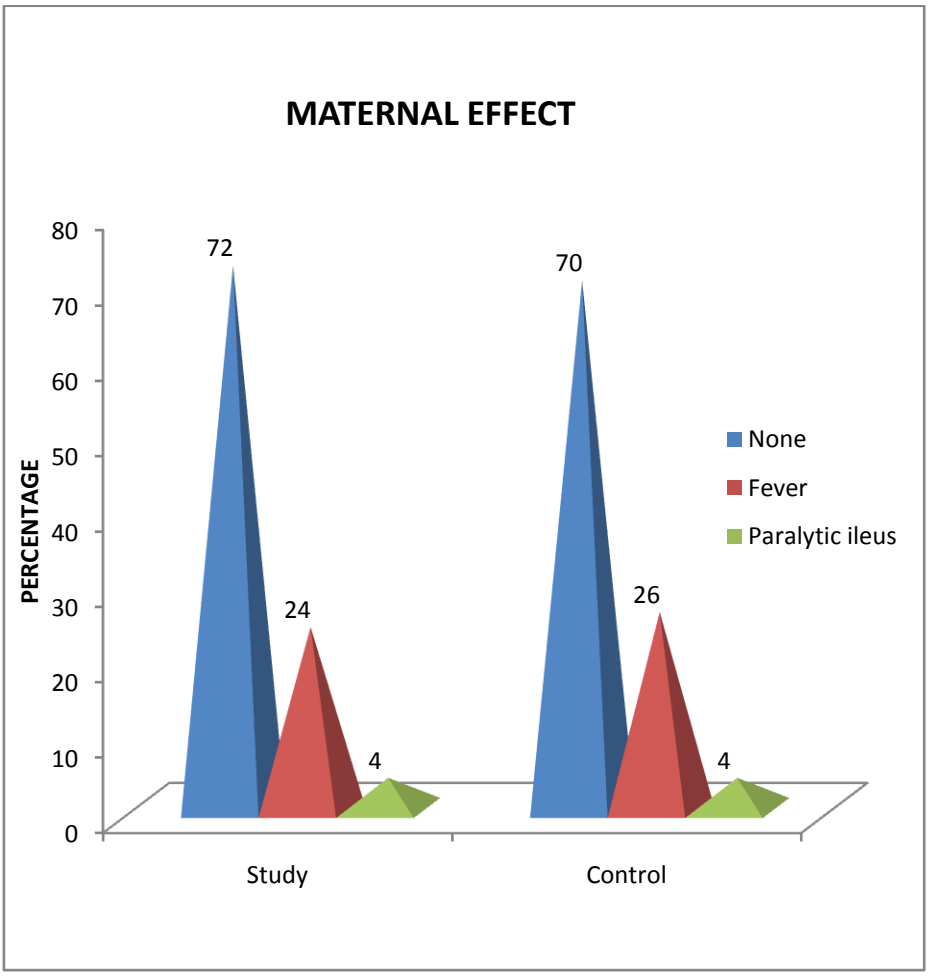


TABLE 14

NICU ADMISSION

NICU ad	Study (n=50)	Control (n=50)	Total (n=100)	Statistical difference
Yes	32(64%)	21(42%)	53(53%)	X^2=4.857 df=1.028<0.05 Significant
No	18(36%)	29(58%)	47(47%)	

Newborn admissions were significantly higher among the study group as out of 50 infants 32 got admitted. In control group among 50 infants only 21 got admitted. The statistical test showed P value of 0.028 < 0.05 which is significant. This implies that with decreasing AFI perinatal risk increases evident from the fact that more infant among study group needed NICU care.

CHART 14

NICU ADMISSION

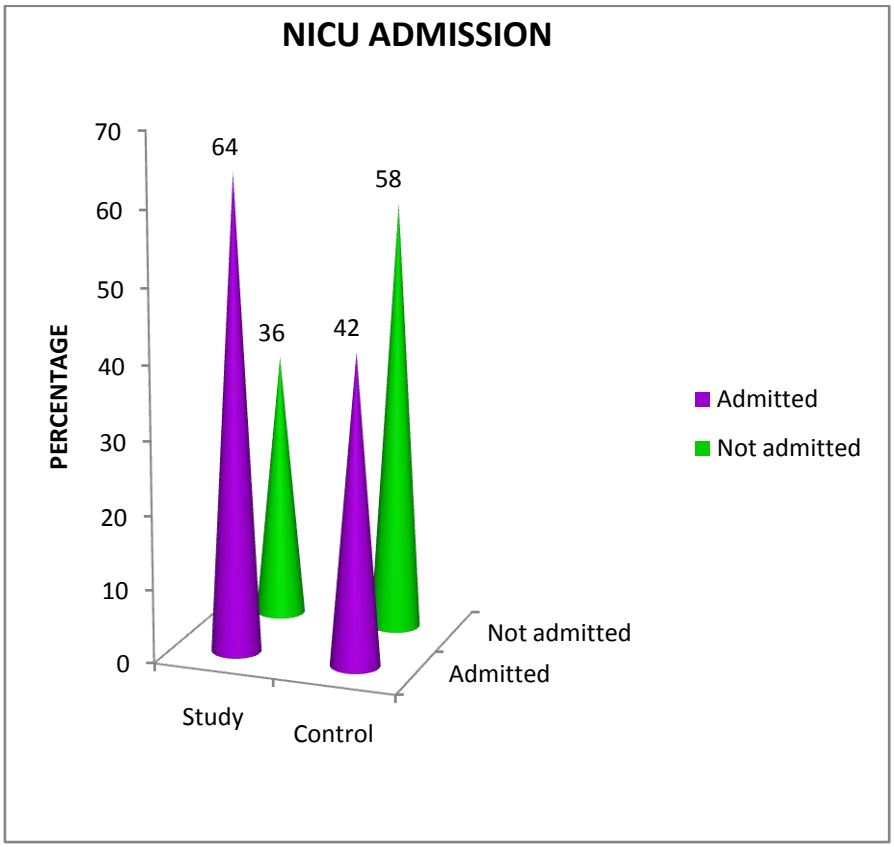


TABLE 15

MODE OF DELIVERY IN STUDY GROUP

AFI	LSCS (n=28)	LN/Epi (n=22)	Total (n=50)
5	9(32.1%)	1(4.5%)	10(20%)
6	7(25%)	4(18.2%)	11(22%)
7	6(21.4%)	7(31.8%)	13(26%)
8	6(21.4%)	10(45.5%)	16(32%)

The mode of delivery in study group was found among 50 patients 28 had LSCS and 22 had Labour natural which showed LSCS is significantly higher in study group and also showed with decreasing AFI index LSCS increased evident by 9 with AFI 5cm , 7 with AFI 6cm, 6 with AFI 7cm, 6 with AFI 8cm had LSCS more (32.1%) with 5cm.

CHART 15

MODE OF DELIVERY IN STUDY GROUP

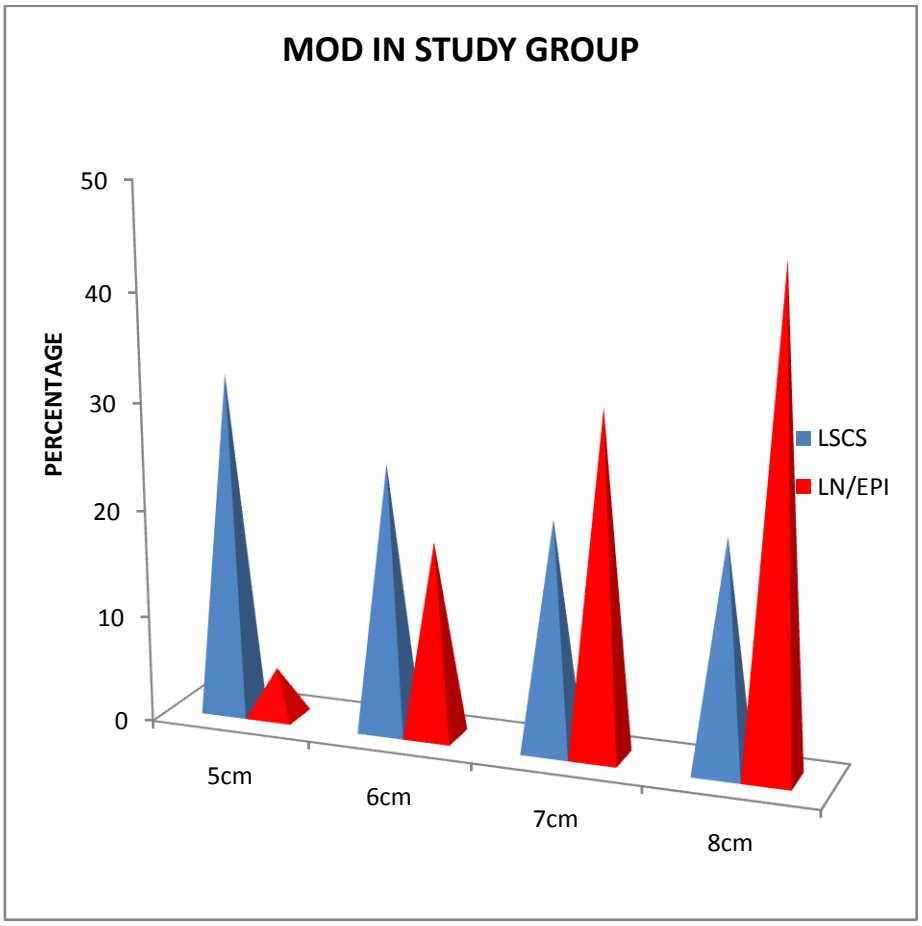


TABLE 16

INDUCTION-DELIVRY INTERVAL AND MATERNAL EFFECT

Maternal effect	Induction delivery interval			Statistical inference
	<12hrs (n=64)	>12hrs (n=36)	Total (n=50)	X^2=21.205 df=2 .000<0.05 Significant
No effect	55(85.9%)	16(44.4%)	71(71%)	
Fever	9(14.1%)	16(44.4%)	25(25%)	
Paralytic ileus	0	4(11.1%)	4(4%)	

Maternal effect had significant difference when compared between the induction delivery interval. Patients delivered less than 12 hours had less incidence of fever and paralytic ileus but patients who delivered more than 12 hours had more incidence of fever 44.4% and 11.1% had paralytic ileus. Chi-square test showed significant difference of 0.00 < 0.05 which signifies with increasing time interval maternal outcome significantly differs.

CHART 16

INDUCTION-DELIVERY INTERVAL AND MATERNAL EFFECT

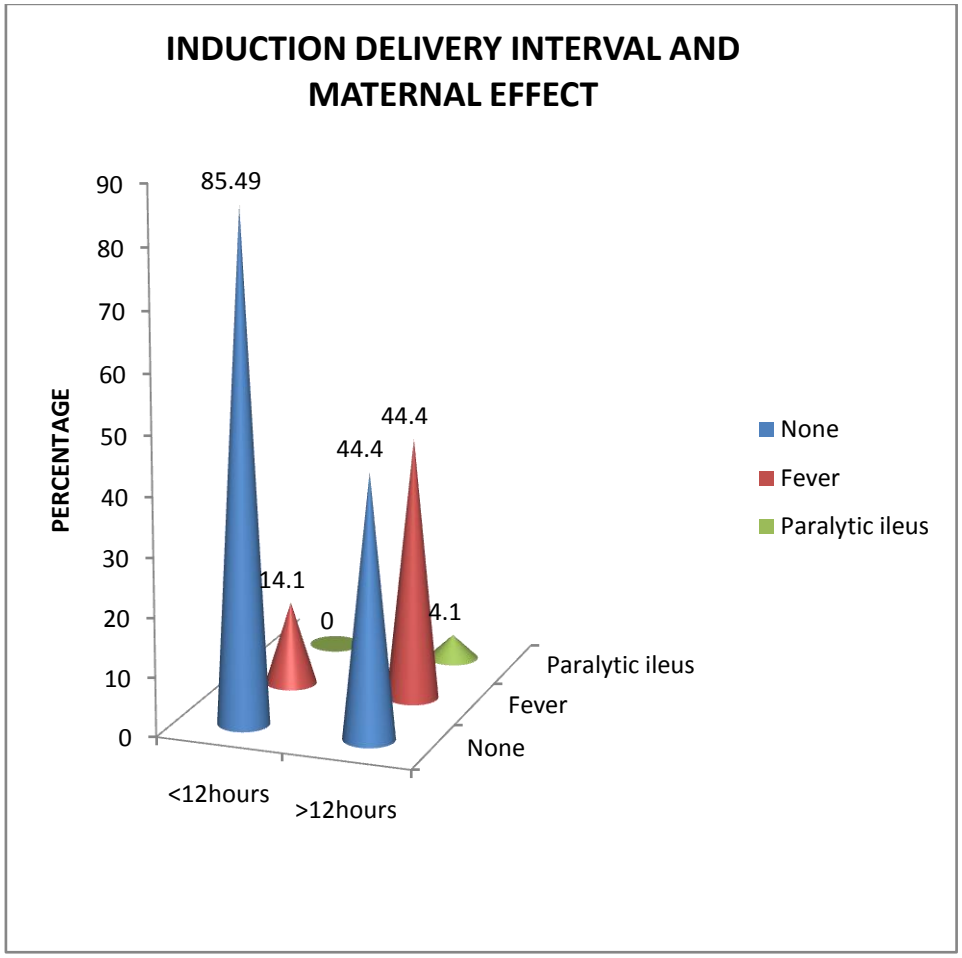


TABLE 17

MODE OF DELIVERY IN REACTIVE NST GROUP

MOD	**Reactive NST**			**Statistical inference**
	Study (n=23)	Control (n=35)	Total (n=58)	X^2=1.054 df=1.304>0.05 Not Significant
LSCS	5(21.7%)	12(34.3%)	17(29.3%)	
LN/Epi	18(78.3%)	23(65.7%)	41(70.7%)	

Mode of delivery among reactive NST patients showed 17 by LSCS and 41 by Labour natural with no statistical difference among study and control groups as the P value was 0.304>0.05 which is insignificant.

CHART 17

MODE OF DELIVERY IN REACTIVE NST GROUP

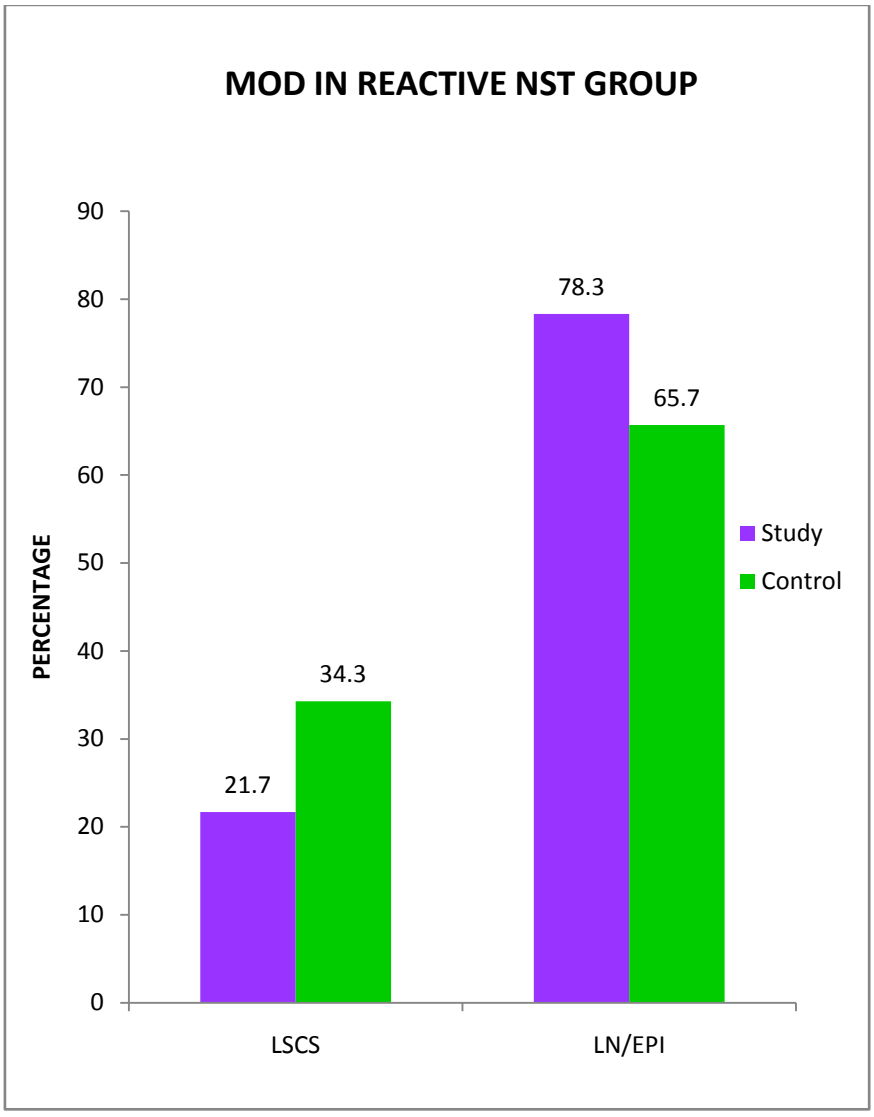


TABLE 18

MODE OF DELIVERY IN NON-REACTIVE NST GROUP

MOD	**Non-Reactive NST**			**Statistical inference**
	Study (n=27)	Control (n=15)	Total (n=42)	X^2=.187 df=1
LSCS	23(85.2%)	12(80%)	35(83.3%)	0.023<0.05 Significant
LN/Epi	4(14.8%)	3(20%)	7(16.7%)	

Among the study group who had the Non-Reactive NST i;e 27 patients 23 had LSCS and 4 had Labour natural. The statistical difference with P value 0.023<0.05 indicates that with reducing AFI Non-Reactive NST increases and lead to more interventional mode of delivery as LSCS.

CHART 18

MODE OF DELIVERY IN NON-REACTIVE NST GROUP

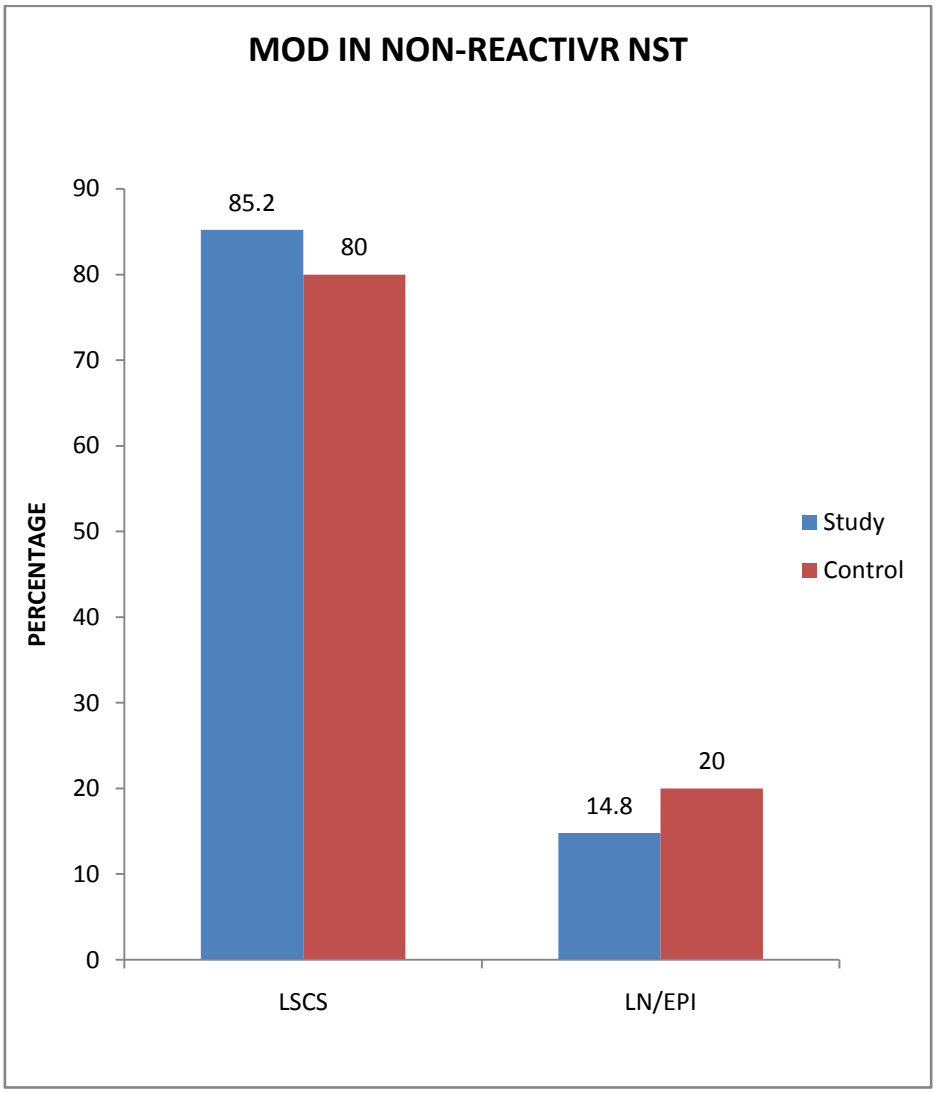


TABLE 19

APGAR AT "1MINUTE" AND " 5MINUTE"

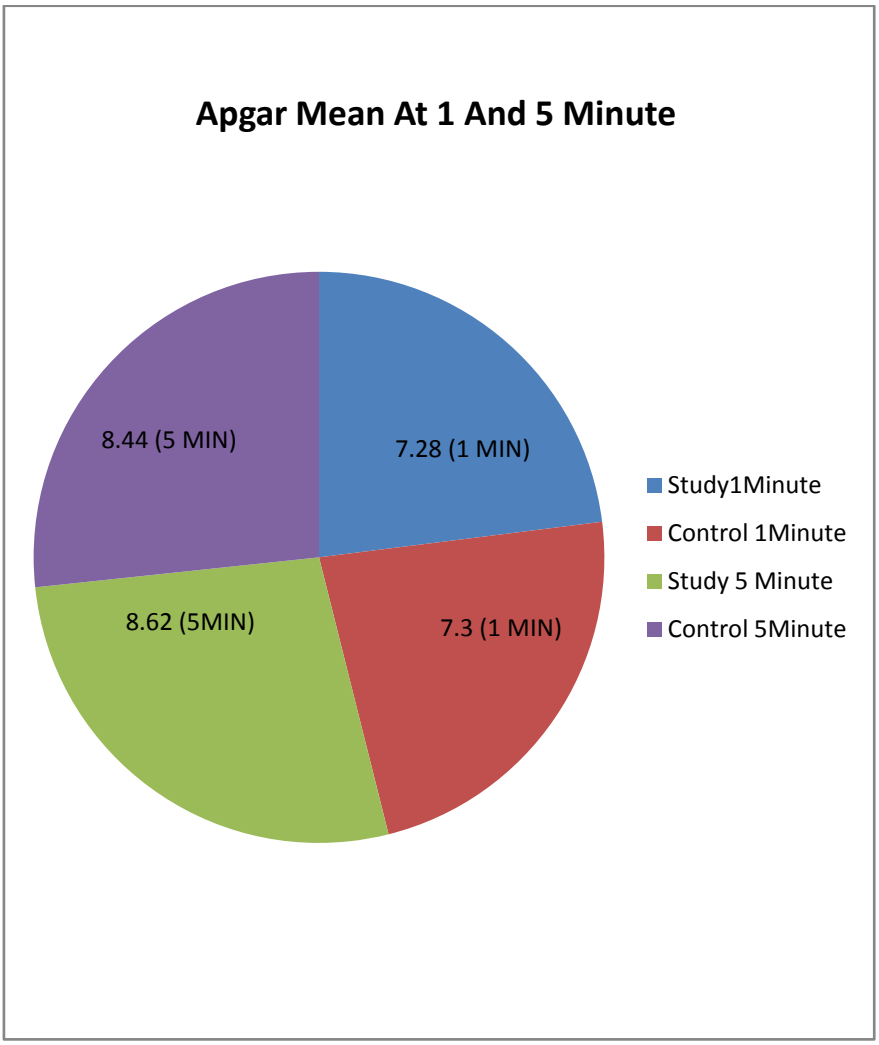
Apgar 1min	Mean	Standard deviation	Statiscal difference
Study (n=50)	7.28	.948	T=-.101 Df=98 .920>0.05 Not Significant
Control (n=50)	7.30	1.035	

Apgar5min	Mean	Standard deviation	Statistical difference
Study(n=50)	8.62	.602	T=-2.167 Df=98 .018<0.05 Significant
Control (n=50)	8.64	.598	

Apgar at 1 minute had no difference among both the groups but there was difference in 5 minute Apgar as the P value was 0.018<0.05 which signifies that perinatal morbidity is increased in study group means borderline AFI with decreasing liquor increases the risk of fetal distress.

CHART 19

APGAR AT "1MINUTE" AND " 5MINUTE"



DISCUSSION

DISCUSSION

Amniotic fluid is the protective milieu that nourishes the fetus and in process of labour it helps the fetus to maintain the acid – base balance so that it does not goes into distress. With decreasing amniotic fluid the fetus may have increased perinatal risk.

In this study, perinatal risk is assessed in aspect of decreasing amniotic fluid level measured as AFI ; Borderline AFI 5 to 8cm and its impact in perinatal outcome and indirectly maternal outcome.

Phelan et al[34] studied about the amniotic fluid index measurements during pregnancy and concluded that its usefulness in assessing the fetal surveillance throughout pregnancy.

Amniotic fluid index is useful screening test for detecting intrapartum fetal distress and early intervention to deliver an infant with good Apgar. Colleen and Mark et al[35] studied the impact of amniotic fluid volume assessed intrapartum on perinatal outcome concluded that its good in predicting the risk.

In the study the impact of borderline AFI is studied and the outcome signifies the perinatal risk can be assessed by amniotic fluid index.

In the study carried out, Non-Reactive pattern of NST was more in study group 54% had Non-Reactive NST. Erika et al[36] concluded in their study as borderline AFI had 2 fold increase adverse perinatal

outcome in the borderline AFI group with regards to Non Reactive NST and meconium stained amniotic fluid . 30% of control group had Non- Reactive NST compared with 54% in control group with reasons of cord compression or cord around neck.

In this study fetal heart pattern in reference to decelerations 52% had deceleration in intrapartum monitoring compared to 30% in control group. Jeng et al[37] observed non reassuring fetal heart tracings for which cesarean deliveries carried out and David et al[36] in their study observed decelerations in borderline AFI group and two fold increase in perinatal risk.

The mode of delivery doesnot had significant difference as 56% of study group had LSCS and 48% had LSCS in control group which is not statistically different. Baron et al[38] observed the risk associated with borderline AFI which concluded that there is no statistical difference in cesarean deliveries in both groups. Though there was no statistical difference between the groups for mode of delivery, LSCS in study group was comparatively higher as taken for Non-Reactive NST was higher with reducing liquor.

NICU admission was 64% in study group compared with 42% in control group as concluded in Kwon et al[39] , Gumus et al[40] observed that neonatal unit admission were higher in borderline AFI group. Bank s et al[41] observed more NICU admissions in borderline AFI group.

NICU Admisssion in both groups were there with Apgar <7. Apgar at 5 minute had showed significant deviation from control group. Apgar at 5 minutes less than 7 in study group was found to be higher in study group with mean of 8.62 and SD of 0.602. Maryam asgharnia et al[42] an Iranian based study observed that more incidence of Apgar less than 7 at 5 minutes and neonatal unit admission. Kreiser et al [43] studied the effect of borderline AFI and observed that Apgar at 5 minute to be less than 7.

In the study 56% of study group had LSCS with 32% of AFI 5cm had LSCS but only 21.4% with AFI 8cm had LSCS and among them 85% had Non-Reactive NST signifying that with reducing amniotic fluid index the Cesarean rate increases for fetal non reassuring heart rate pattern. Luo et al[44] observed that cesarean rate increases for non reassuring fetal heart rate pattern in their study.

LSCS in both groups were taken for fetal distress,failed incudtion, failure to progress. And reactive CTG in control group

found to be high and also LSCS is about 34.3% in control group but not statistically significant.

In both the groups patients who have delivered by labour natural with Non-Reactive NST were found to have delivered immediately and also been given amnioinfusion and also some were in second stage and neonate sent to NICU and outcome has been followed and compared.

SUMMARY

SUMMARY

- In this study out of 100 patients Demographic parameters, Age, Parity, Gestational Age were comparable in both group.
- 78% of patients were between 21 to 30 years of age and 39 % of study group belongs to this age.
- 58% of patients were primipara and 56% of study group were primipara with 30% second gravida, 11% third gravida, 1 % fourth gravida and above.
- 30% of patients belong to 39 weeks and 40 weeks of gestational age.
- Among the study group, 20% got AFI 5cm, 22% got AFI 6cm, 26% got AFI 7cm and 32% got AFI 8cm and had the LSCS rate of 32% in AFI 5cm group, 25% in AFI 6cm group,21.4% in AFI 7 and 8 cm signifying with reducing AFI more patients had interventional mode of delivery.
- 54% had Non-Reactive NST in study group evident of fetal distress in borderline AFI is more than Normal AFI
- Among the patients who had non reassuring fetal heart rate pattern 52% belong to study group with more variable decelerations of 57.8, late deceleration of 19.2% and early deceleration of 23.1% signifying more perinatal risk in borderline AFI group.

- Onset of labour had no significant difference and induction compared with mode of delivery had no impact on perinatal outcome also as evident in many studies.
- Though the mode of delivery was not significantly different in both groups, cesarean deliveries were more with reducing AFI taken for the indication of fetal distress and persistent non reassuring fetal heart rate tracings.
- Meconium stained amniotic fluid was about 28% in study group compared with 16 % in control group with data showing with AFI reduces the meconium nature increases resulting in low Apgar less than 7 at 5 minute and need of neonatal unit care.
- NICU admission was 64% in study group compared with only 42% in control group signifying the need of neonatal unit care in borderline AFI patients.
- Though there was no significant difference in means of birth weight , maternal effects between both groups ; maternal outcome is significantly affected in respect to increased LSCS deliveries taken for non reassuring fetal heart rate tracings ; and who has delivered more than 12 hours from induction had increased incidence of fever and paralytic ileus ; 44.4% and 4.1% compared with 14.1% and 0% of fever and paralytic ileus

respectively in patients delivered more than and less than 12 hours with respect to induction delivery interval.

CONCLUSION

CONCLUSION

Assessing amniotic fluid antenatally and intrapartum fetal surveillance in means of Amniotic fluid index and Non Stress test helps in monitoring of fetus throughout antenatal period also during labour.

Though many methods are practiced to measure amniotic fluid volume Amniotic fluid index is preferred for its reproducibility nature and can be repeated easily with standarisation and sensitivity more to identify low volumes of amniotic fluid.

Identifying the way the fetus behave during labour in borderline amniotic fluid index patients by means of fetal heart rate tracings (NST) helps in picking up fetal distress earlier and lead to deliver a neonate with good Apgar reducing the perinatal adverse outcome.

With reducing Amniotic fluid index there increases the risk of perinatal outcome and maternal adverse effects, monitoring patients with Borderline Amniotic fluid index is being in increasing trend in modern obstetric practice.

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BIBLIOGRAPHY

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Glossary

GLOSSARY

AFV- Amniotic fluid volume

AFI – Amniotic fluid index

MVP – Mximum vertical pocket

NST – Non-stress test

PAH – Para amino hippurate

PPROM – Preterm premature rupture of membrane

CNS – Central nervous system

CST – Contraction stress test

S/D – systolic diastolic ratio

PNM – perinatal mortality rate

FHR – Fetal heart rate

BPM – beats per minute

BT – Bleeding time

CT – Clotting time

Hb – hemoglobin

LSCS – Lower segment caesarean section

ARM – Artificial rupture of membrane

ECG – Electrocardiogram

Mm – Millimeters

Cm – centimeters

Ml – milliliters

ANNEXURES

PROFORMA

PROFORMA

Name:

Age:

Ip no:

Husband name:

Gravida: Para: Abortions:

Booked/unbooked:

Presenting complaints:

Menstrual history:

Marital history:

Obstetrical history:

LMP EDD

Past surgical history:

Past Medical history:

Family history:

Personal history:

Socio-economichistory

General examination:

Built : Sensorium: Anemia: Edema :

BMI:

Temperature :

Pulse :

BP :

RR:

Systemic examination:

CVS:

RS:

CNS:

Obstetrical examination:

Fundal height:

Acting

Presenting part

Clinical evidence of oligohydramnios:

Fetal heart sound

Estimated fetal weight:

Pelvic examination:

AdmissionCTG:

Diagnosis:

Investigations: urine albumin: Hb%: others :

Ultrasound :

AFI

Labor:

Induced / spontaneous :

Induction-delivery interval:

Appearance of amniotic fluid: clear / thick meconium / thin meconium

Intrapartum CTG:

Maternal outcome:

Mode of delivery:

Delivery notes:

Operative notes:

Indication for lscs:

Post op complications:

Fetal outcome:

Apgar score : 1 min 5min

Birth weight :

Admission to neonatal ward :

Perinatal morbidity:

Perinatal mortality:

CONSENT FORM

நோயாளி சம்மதக் கடிதம்.

மகப்பேறு / பிரசவ காலத்தில் பனிக்குட நீர் சரியான அளவில் இருத்தல் அவசியம். பனிக்குட நீர் குறையும் பட்சத்தில் சேய்க்கு மூச்சுத் திணறல் ஏற்படவும், பிரசவத்தின் போது மூச்சுத் திணறல் ஏற்பட்டு கர்ப்பப் பையிலேயே காட்டுமலம் செல்லவும் வாய்ப்பு அதிகம்.

உங்களை ஈடுபடுத்த திட்டமிடப்பட்டுள்ள இந்த மருத்துவ ஆய்வில் பனிக்குட நீர் குறைவாக உள்ள தாய்மார்கள் (Ultra Sound) அல்ட்ரா சவுண்ட் எனும் ஆய்வின் மூலம் பனிக்குட நீர் அளவையும் (Amniotic Fluid Index) Nonstress test கார்டியோ டோகோகிராம் மூலமும் கண்காணிக்கப்படுவார்கள். இதன் மூலம் சேய் நலன் கண்காணிக்கப்படும்.

அனைத்து மருத்துவ முறைகளில் இருப்பது போலவே, இம்மருத்துவ முறையிலும் எதிர்பாரா இடர்கள் நேரிடலாம்.

உங்கள் மருத்துவ பதிவேடுகள் மிகவும் அந்தரங்கமாக வைத்து கொள்ளப்படும். இந்த ஆய்வு முடிவுகள் அறிவியல் பத்திரிக்கைகளில் பிரசுரிக்கப்படலாம். ஆனால் உங்கள் இரகசியத் தன்மை பாதுகாக்கப்படும். இந்த ஆய்விலிருந்து தாங்கள் எந்த நேரமும் காரணமில்லாமல் விலகி கொள்ளலாம். எப்படியிருந்தாலும் தேவையான சிகிச்சை அளிக்கப்படும்.

மேற்கூறிய மருத்துவ தகவல்களை இந்த ஆய்வினை மேற்கொள்ளும் மருத்துவர் மூலம் அறிந்து நான் தன்னிச்சையாக இந்த ஆய்வில் பங்கேற்கிறேன். இந்த ஆய்வு சம்மந்தமாகவோ, இதை சார்ந்த மேலும் மேற்கொள்ளும் மற்ற ஆய்வுகளில் பங்கேற்கும் மருத்துவர் என் மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என்பதை அறிவேன். எனது மற்றும் எனது குழந்தையின் நலன் கருதியே இந்த ஆய்வு மேற்கொள்ளப்படுகிறது என்று தெரிந்து இந்த ஆய்விற்கு சம்மதிக்கிறேன்.

கையொப்பம்
(அல்லது)
இடது கட்டைவிரல் கைநாட்டு

Master chart

CONTROL GROUP

S.No	Name	Age	IP No	Obst score	GA	AFI	NST	FH pattern	Induced /Spon	MOD	Induction delivery interval	Indication	AF	Apgar 1min	Apgar 5min	B.Wt (kg)	NICU ad	Neo Death	Maternal effect
1	Vanitha	32	40803	Primi	37	6	NR	VD	I	LSCS	1		M	6/10	9/10	2.8	1		0
2	Vembu	27	40584	Primi	40	8	R		I	LN/epi	1		C	8/10	9/10	3.3	2	-	0
3	Freida	24	40600	Primi	38	6	NR	VD	S	LSCS	2	FD	M	5/10	8/10	3.5	1	-	1
4	Lakshmi	25	40837	Primi	39	7	R		S	LN/epi	2		C	8/10	9/10	2.7	2	-	0
5	Jesima	19	40761	Primi	40	8	R		I	LN/epi	1		C	6/10	8/10	2.7	2	-	0
6	Sankari	22	40491	G2p1l1	40	7	NR	VD	I	LSCS	1	FD	M	8/10	9/10	2.8	1	-	1
7	Fathima	23	40772	G2p1l1	38	6	R		I	LN/epi	2		C	8/10	9/10	3.3	2	-	0
8	Latha	27	40465	G2p1l1	39	7	R		S	LSCS	1		C	8/10	9/10	3.5	2	--	0
9	Vijaya	35	40493	Primi	38	5	NR	LD	I	LSCS	1		C	6/10	8/10	4	1	-	0
10	Revathi	28	40983	Primi	37	8	R		I	LN/epi	1		C	7/10	10/10	2.7	2	-	0
11	Kanaga	23	40449	G2p1l1	39	6	NR	VD	S	LSCS	1		C	8/10	9/10	3	2	-	1
12	Fathima	19	40803	Primi	40	5	NR	VD	I	LSCS	1	FD	M	8/10	9/10	3.1	1	-	0
13	Gomathi	22	39482	G2a1	37	8	R		I	LN/epi	2		C	8/10	9/10	2.7	2		0
14	Gomathi	28	40775	G2p1l1	38	6	R		S	LN/epi	1		C	8/10	8/10	3.5	2		0
15	Rajeswari	19	28273	Primi	37	7	NR	ED	S	LN/epi	1		C	7/10	9/10	2.75	2		0
16	Malar	27	27018	G2	39	7	NR	ED	I	LN/epi	1		C	6/10	8/10	2	1		0
17	Bakya	29	27884	G3p2l2	40	7	R		S	LN/epi	1		C	8/10	9/10	3.5	2		0
18	Kalai	25	28667	G2p1l1	40	8	R		S	LN/epi	2		C	7/10	9/10	2.5	1		0
19	Bhuvana	27	27714	Primi	40	5	NR	VD	I	LSCS	1	FD	M	6/10	9/10	2.75	1		0
20	Ilandevi	26	18350	G2p1l1	40	8	R		S	LSCS	2		C	8/10	9/10	3.5	2		1
21	Kavitha	21	28342	G2p1l1	40	6	NR	VD	S	LN/epi	1		M	8/10	9/10	2.8	1		0

22	Kanaga	23	28362	G2p1l1	39	7	R		I	LN/epi	1		C	8/10	8/10	2.75	2		0
23	Sundari	33	28276	G3p2l2	38	5	NR	VD	S	LSCS	1	FD	M	8/10	9/10	2.9	1		1
24	Shobana	25	28320	Primi	37	7	R		S	LSCS	1		C	8/10	9/10	2.9	2		0
25	Chitra	20	28364	Primi	38	5	NR	ED	S	LSCS	2		C	7/10	8/10	2.4	1		2
26	Sudha	24	28354	G2p1l1	38	7	R		S	LN/epi	1		C	8/10	9/10	3	2		0
27	Priya	22	28426	Primi	38	7	NR	VD	I	LSCS	1		C	8/10	9/10	2.5	1		0
28	Saranya	27	28389	Primi	39	8	NR	VD	S	LSCS	1	FD	M	8/10	8/10	3.25	1		0
29	Reka	22	28443	Primi	39	7	NR	ED	I	LSCS	1		C	8/10	8/10	3.5	1		1
30	Sureka	25	28530	G2a1	40	8	R		S	LSCS	1		C	8/10	9/10	3.5	2		0
31	Malathi	22	284557	G3p2l2	39	8	R		S	LN/epi	2		C	8/10	9/10	2.5	1		0
32	Rihana	25	28514	Primi	40	8	NR	VD	S	LSCS	1		M	6/10	9/10	2.6	1		1
33	Kavitha	23	28470	Primi	40	8	R		S	LN/epi	1		C	8/10	9/10	3	2		0
34	Saranya	26	28454	Primi	37	6	NR	VD	I	LSCS	2		M	7/10	8/10	2.2	1		1
35	Revathi	19	28409	Primi	38	7	R		I	LN/epi	2		C	8/10	9/10	3	2		0
36	Parvathi	21	29621	Primi	38	5	NR	VD	I	LSCS	1	FD	M	5/10	7/10	2.7	1		0
37	Kirithika	20	29623	G2a1	39	5	NR	VD	I	LSCS	1	FD	M	5/10	7/10	2	1		0
38	Jeeva	23	29638	Primi	39	8	R		S	LN/epi	2		C	8/10	9/10	2.75	2		1
39	Nitya	26	29652	Primi	38	6	NR	LD	S	LSCS	1		C	7/10	8/10	2.3	1		1
40	Yasmin	29	29664	G2p1l1	38	5	NR	VD	S	LSCS	1		M	7/10	9/10	3.1	1		1
41	Rani	25	20876	G3p1l1a1	38	8	R		S	LN/epi	2		C	8/10	9/10	2.9	2		0
42	Lakshmi	20	29639	Primi	38	5	NR	LD	I	LSCS	1		M	6/10	9/10	3.25	1		0
43	Roobini	26	29239	Primi	40	6	R		I	LSCS	1		C	7/10	8/10	3	2		0
44	Seetha	24	29553	Primi	40	8	NR		I	LSCS	2		C	7/10	8/10	2.75	1		2
45	Usha	24	30385	Primi	39	6	NR	LD	S	LSCS	1		C	6/10	8/10	2.3	1		0

46	Ameena	23	30319	G2a1	38	5	R		S	LN/epi	1		C	8/10	9/10	3.1	2		0
47	Meena	24	23341	G3p2l1	39	8	NR	LD	S	LSCS	1		C	7/10	8/10	2.9	2		0
48	Baby	33	31712	Primi	38	7	NR	ED	I	LSCS	2		C	7/10	8/10	3.25	2		1
49	Girija	27	30949	G2p1l1	39	8	NR	ED	S	LN/epi	1		C	8/10	9/10	3	2		0
50	Anitha	27	31769	Primi	40	6	R		I	LN/epi	2		C	8/10	9/10	2.75	2		0

CONTROL GROUP

S.No	Name	Age	IP No	Obst score	GA	AFI	NST	FH pattern	Induced /Spon	MOD	Induction delivery interval	Indication	AF	Apgar 1min	Apgar 5min	B.Wt (kg)	NICU ad	Neo Death	Maternal effect
1	Chandra	27	31841	G3p2l2	40	10	R		S	LN/epi	1		C	8/10	9/10	2.3	1		0
2	Nathiya	20	31803	Primi	40	11	R		S	LSCS	2		C	8/10	9/10	3.1	2		1
3	Sheela	19	31235	Primi	40	9	R		I	LN/epi	1		C	8/10	9/10	2.6	2		0
4	Priya	24	31669	Primi	40	12	R		I	LN/epi	1		C	7/10	8/10	3	2		0
5	Poongodi	21	31297	G2p1l1	39	14	NR	VD	I	LSCS	2		C	5/10	8/10	3.4	1		1
6	Roobiya	25	31935	Primi	37	9	R		I	LN/epi	1		C	8/10	9/10	3	2		0
7	Sabhitha	20	31977	Primi	37	10	R		S	LSCS	1		C	8/10	9/10	3	2		0
8	Vinodha	23	31500	Primi	38	14	R		S	LN/epi	2		C	7/10	8/10	3.1	2		0
9	Vanitha	23	34945	G2p1l1	38	12	R		S	LN/epi	1		C	7/10	9/10	2.25	1		0
10	Mala	23	34941	G2p1l1	39	11	NR	VD	I	LSCS	2	FD	M	4/10	8/10	3.9	1		1
11	Abirami	21	35132	Primi	38	10	R		I	LN/epi	2		C	8/10	9/10	3	2		0
12	Menaka	28	34038	Primi	39	13	R		I	LSCS	1		C	8/10	9/10	2.25	2		0
13	Rani	30	34998	G2p1l1	38	10	R		S	LN/epi	2		C	8/10	9/10	2.8	2		0
14	Marikannu	21	35064	Primi	38	12	NR	LD	S	LSCS	2		C	5/10	7/10	2.7	1		1
15	Aiswarya	16	38844	Primi	39	11	R		S	LSCS	1		C	8/10	9/10	2.8	2		0
16	Ilakiya	20	38606	Primi	40	10	R		I	LN/epi	2		C	6:10	8/10	3.1	2		0
17	Gokila	29	38835	G3p2l1	37	9	R		S	LSCS	1		C	8/10	9/10	2.5	2		0
18	Selena	32	40780	G3p2l2	37	12	NR	VD	S	LN/epi	1		M	5/10	8/10	3.3	1		0
19	Kritika	23	29638	G2a1	39	14	R		I	LSCS	2		C	8/10	9/10	2.71	2		2
20	Nathiya	27	29874	G3	38	13	R		S	LN/epi	1		C	8/10	9/10	2.3	2		0
21	Veni	21	29908	Primi	39	12	R		S	LN/epi	2		C	7/10	8/10	2.8	2		0

22	Akila	25	30009	G2a1	40	9	NR	ED	S	LSCS	1		C	7/10	7/10	2.75	1		0
23	Shobana	23	30135	G2	39	9	R		I	LN/epi	1		C	8/10	9/10	3.5	2		0
24	Sangeetha	20	30259	Primi	38	11	R		I	LN/epi	2		C	8/10	9/10	2.5	2		1
25	Soorya	20	30356	Primi	38	11	NR	ED	I	LN/epi	2		M	8/10	9/10	2.8	1		1
26	Usha	24	30987	Primi	39	12	NR	VD	S	LSCS	1	FD	M	7/10	9/10	3.25	1		1
27	Seetha	26	30456	G2p1	37	10	R		S	LN/epi	1		C	7/10	8/10	3	2		0
28	Nayagi	24	30532	Primi	37	9	NR	ED	S	LSCS	2		C	8/10	9/10	3	2		1
29	Jesina	27	35753	G2p1l1	40	9	R		I	LN/epi	1		C	8/10	9/10	2.5	2		0
30	Laksmi	21	30119	Primi	39	10	NR	VD	S	LSCS	1	FD	M	5/10	7/10	3.2	1		0
31	Vinodha	20	30897	Primi	38	11	R		I	LN/epi	2		C	7/10	9/10	2.2	1		1
32	Arasi	26	30886	G3p2l2	38	12	R		S	LN/epi	1		C	7/10	9/10	3	2		0
33	Renuka	21	31325	Primi	39	9	NR	VD	S	LSCS	1	FD	M	8/10	9/10	3.5	1		0
34	Vasantha	20	30265	G2p1l1	40	11	R		I	LN/epi	1		C	8/10	9/10	2.2	1		0
35	Selvi	25	30764	Primi	40	13	R		I	LSCS	1		C	8/10	9/10	3	2		0
36	Eswari	26	32529	G3p2	39	9	R		S	LSCS	1		C	8/10	9/10	3.5	2		0
37	Valli	29	31805	Primi	39	14	NR	ED	I	LSCS	2		C	7/10	8/10	3.25	1		2
38	Nisha	29	32373	G2p1l1	40	11	NR	VD	I	LSCS	1	FD	M	7/10	9/10	2.6	1		0
39	Kalarani	24	30987	G4p3l3	40	10	R		S	LN/epi	1		C	8/10	9/10	2.5	2		0
40	Meena	21	30397	Primi	39	9	R		S	LN/epi	2		C	8/10	9/10	3	2		0
41	Vijaya	24	30453	G2p1l1	39	12	R		S	LSCS	1		C	7/10	8/10	2	2		0
42	Sheela	24	30563	Primi	38	11	R		I	LN/epi	2		C	7/10	8/10	2.4	2		0
43	Rani	26	30843	Primi	40	13	R		I	LN/epi	2		C	7/10	8/10	2.5	2		1
44	Saranya	27	30245	Primi	40	14	R		S	LSCS	2		C	8/10	9/10	2.5	2		1
45	Jothi	25	21987	Primi	40	11	NR	ED	I	LN/epi	2		C	9/10	9/10	3.5	2		0

46	Sangeetha	21	21567	Primi	39	10	NR	ED	I	LSCS	1		C	6/10	9/10	3	1		1
47	Valli	20	21450	G2p1l1	38	9	NR	VD	S	LSCS	1	FD	M	8/10	9/10	2.9	1		0
48	Santhi	30	30256	Primi	39	9	R		S	LSCS	1		C	7/10	9/10	2.8	2		0
49	Ramya	22	30827	Primi	39	10	R		I	LSCS	1		C	7/10	9/10	3	2		0
50	Reena	21	30961	Primi	40	10	R		S	LN/epi	2		C	8/10	9/10	2.4	2		1

KEY TO MASTER CHART

Obstetric score:

Gravida: Primi-1

G2- 2nd gravida

G3-3rd gravida

G4-4th gravida

Parity: P1- Para 1

P2- Para 2

P3- Para 3

P4- Para 4

GA – Gestational age

AFI – Amniotic fluid index

NST– Non stress test

R-reactive

NR- non reactive

FH pattern: Fetal heart pattern

ED – Early deceleration

VD – Variable deceleration

LD – Late deceleration

Induced or spontaneous :

I – induced

S – spontaneous

Induction-delivery interval:

1- <12hours

2- >12 hours

Indication: FD- fetal distress

Amniotic fluid nature:

C- clear

M- meconium stained

Nicu ad(neonatal icu admission) :

1-admitted

2 – not admitted

Maternal effect:

1- No complication

2 – fever

3 – paralytic ileus

4 – wound gaping