"MATERNAL PERCEPTION OF DECREASED FETAL MOVEMENTS IN TERM PREGNANCY AND ITS NEONATAL OUTCOME"

By

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Under the Guidance of

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ABSTRACT

BACKGROUND:

Movements of the fetus is a sign of fetal existence and welfare.[1] Sensation of movements of the fetus by the mother are caused by the push against the abdominal wall due to gross fetal movement or limb movement.

AIMS AND OBJECTIVES:

1. To identify antenatal risk factors related to decreased fetal movements like pre eclampsia, overt diabetes, oligohydramnios, abruptio placenta, placenta previa.

2. To evaluate perinatal outcome like low APGAR score, need for resuscitation, need for NICU admission, still birth, intrauterine death.

MATERIALS & METHODS:

Study site: The current study was conducted in the department of Obstetrics and Gynecology at RLJH hospital Kolar.

Study subject : All pregnant women who complained of perception of reduced fetal movements at presentation and delivered at RLJH Hospital were considered as study population.

Study design: The present study was a prospective observational study.

Sample size: A total of 100 participants were considered in the study.

RESULTS:

A total of 100 women were investigated who belonged within the inclusion criteria. Antenatal history, CTG assessment, ultrasound for Biophysical profile, placental

location were done and followed up till delivery. Neonatal outcome was noted using APGAR scores, NICU admission and Intrauterine death. Majority of the mothers who came with diminished fetal movements were between 21-25 years of age group (48%), Primigravida (48%), 49% presented at 37- 37+6 weeks of pregnancy. Multiple risk factors were identified, most common being Preeclampsia(20%). Popular (46%) pattern of reduced movements was both in frequency plus intensity. 56% women with less fetal movements had anteriorly placed placenta. Univariate regression analysis showed statistically significant association of decreased fetal movements with risk factors with many descriptive factors such as multigravida, gestational age 39- 40+6 weeks, intensity of fetal movement, perinatal outcome of IUFD, birth weight $>= 2.5$ kg. The strongest association was found with IUFD. (P value<0.023)

CONCLUSION:

Every pregnant woman who is anxious about decreased fetal movements should seek medical help. This study shows that there is a connection between risk factors and reduced fetal movements which is proved to be statistically significant. Adverse neonatal outcomes like intrauterine death and NICU admission were recorded.

In most of the developing countries like India, pregnant women have to be educated regarding the importance of counting fetal movements and its poor neonatal outcome. They should be evaluated by detailed history taking, thorough investigation to identify factors causing threat, along with fetal well-being.

Early presentation to the hospital, obstetric evaluation and prompt intervention can prevent adverse neonatal outcome.

INTRODUCTION

INTRODUCTION

Fetal movement is a sign of fetal existence and welfare.[1] Sensation of movements of the fetus by the mother is caused by the push against the abdominal wall due to gross fetal movement or limb movement. [2] Fetal activity serves as an indirect measure of CNS integrity and function.

Counting of fetal movements is when a woman who is pregnant counts and records her baby's movements in order to monitor the baby's health and is explained as the maternal sensation of any distinct kick, tremor, waggle or roll. [3] Pregnant women usually sense fetal movements from 18-20 weeks of gestation whereas some multiparous women perceive it at 16 weeks.[4] The number of fetal movements tends to stabilize after 32 weeks of pregnancy, although there is no reduction in the late third trimester.

By term, usually 31 movements per hour is felt (ranging from 16-45) with the length of duration between movements being from 50–75 minutes. The regularity and character of movement depends on the development of fetus. [5]

Fetal movements follow a circadian pattern and are absent during fetal sleep, periods which actually last 20-40 minutes and hardly more than 90 minutes.   Fetal movements show diurnal changes. The midday and late evening periods show peak activity. Position of placenta, administration of corticosteroids in antenatal period, cigarette smoking, alcoholism, use of sedative drugs, increased maternal blood sugar, maternal position and activity are the factors which can affect the perception of fetal movements. [6-11]

Fetal death is commonly indicated by decreased sensation of movements of the fetus by the mother. Early recognition of DFM makes it possible for the obstetrician to intervene at a stage when the fetus is still compensated, and thus prevent progression to fetal injury or death.

Generally, perception of decreased movements of the fetus in the 3rd trimester ranges between 4-15%. [12,13] It affects around 5-15% of pregnancies.[3] Reduced fetal movements leads to 6.1 % of the workload of acute maternity assessment services. Around 55 % of mothers who have a stillbirth note a decline in fetal movement prior to the diagnosis. [14]

Association between the decreased fetal movement sensed by the mother and poor perinatal outcome such as oligohydramnios, preterm births, fetal growth restriction, congenital anomalies of the fetus, stillbirth and fetal distress are identified in various studies. [15-17] If inadequate steps are taken for the presentation of decreased fetal movements, it can lead to stillbirth. [18]

NEED OF THE STUDY

Intrauterine movements of the fetus is a sign of fetal welfare. When the expecting mother presents with decreased perception of fetal movements, it causes a state of worry for both obstetrician and the mother. Insufficient assessment of diminished fetal movements can result in catastrophic perinatal outcome. While the majority of these pregnancies and births are simple, it's vital to distinguish the women at risk for poor fetal outcome from the varied group of pregnancies with diminished fetal movements. A proper risk assessment for this population can assist to strike a balance between unnecessary procedures and over-investigation while still ensuring a

positive neonatal outcome. The purpose of this study was to investigate the mother's experience of diminished fetal movements throughout term pregnancy, as well as the neonatal outcome.
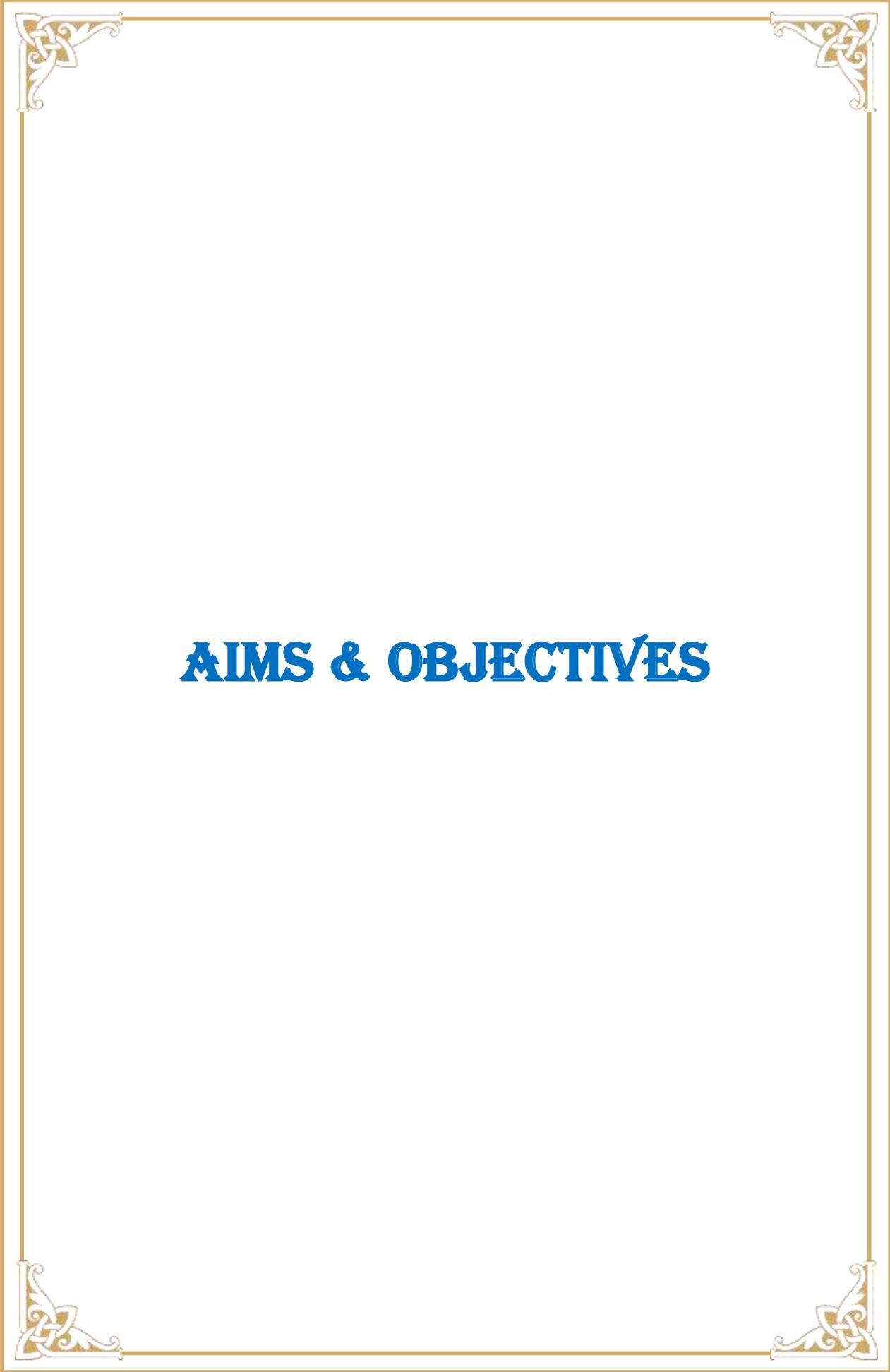
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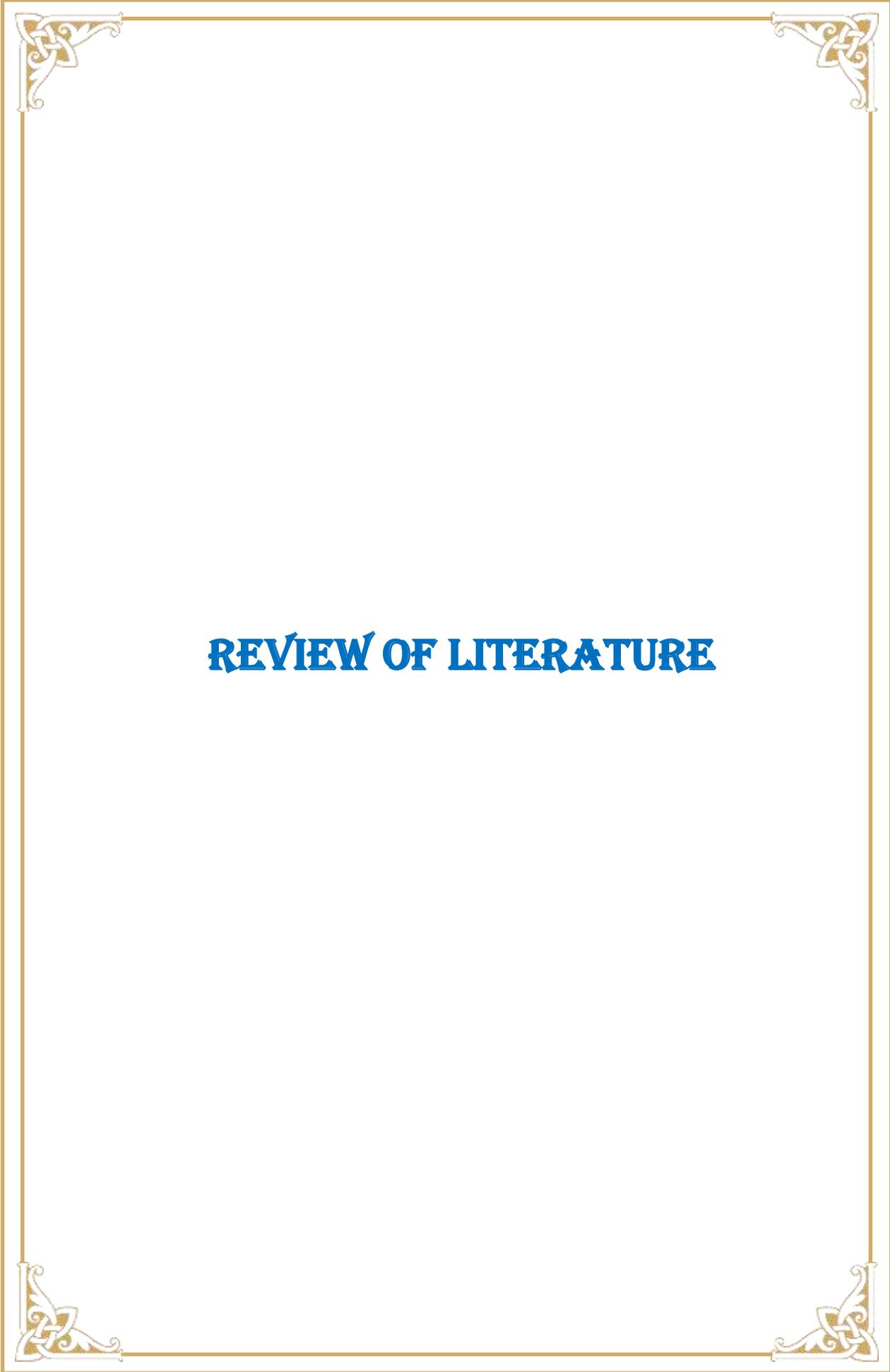
REVIEW OF LITERATURE

REVIEW OF LITERATURE:

1.   Reduced Fetal Movements - RFM

● **Definition**

Reduced fetal movements, is usually described as a subjective perception of decrease in the fetal movements. [3]

● **Maternal perception of RFM**

Fetal activity is a subjective evaluation which is determined by maternal perception.[19,20] Few researches have shown that there is a correlation of 37-88% between ultrasound and maternal perception. Early gestation, reduced liqour, fetal sleep pattern, obesity, anterior placenta, smoking and nulliparity are a set of variables which may lead to reduced fetal movements.

Drugs like alcohol, methadone, benzodiazepines and other opioids and cigarette smoking can result in the transient suppression of fetal movements. Few of the women who presented with complaints of DFM told that they were very busy to feel for fetal movements. It is identified that less movements are perceived while standing or sitting as compared with lying down or while concentrating on movements.[5]

Kick charts were used to determine fetal movements but are not currently recommended. In fact, significant maternal anxiety, labour induction and caesarean section are linked to the usage of kick charts.[21] If there is doubt regarding perceived DFM after 28 weeks of gestation, pregnant women are advised to sleep in left lateral position and to concentrate on fetal movements for 2 hours. If they are unable to feel

10 or more distinct movements in 2 hours they should seek help of their obstetrician as soon as possible.

● **Normal fetal movements – short note**

Normal fetal movements is described as 10 or more fetal movements in 2 hours, perceived by a pregnant woman when she is resting on her side and concentrate on the movement. [20-22] The fetal movements can be perceived as 'distinct kick, tremor, waggle or roll'. It validates the central neurological and musculoskeletal systems' integrity, felt by majority of women by 20 weeks of gestational age.

By term, usually 31 movements per hour is felt (ranging from 16-45) with the length of duration between movements being from 50–75 minutes. Movements of the fetus during the sleep cycles can be absent. It lasts about 20–40 minutes and hardly exceed 90 minutes. The amount and nature of activity changes along with the growth of the baby. Pregnant women should be educated about the risk of decreased fetal movements during the antenatal visits. [5]

Nijhuis and colleagues described four fetal behavioural states:

State 1F is a quiescent state that is small nap with a narrow oscillatory bandwidth of heart rate of the fetus .

2F state involves entire body movements, continuous eye movements, and variability in the heart rate of fetus.

3F state involves progressive moving in the eye with no movements of the body and no variability in heart rate of the fetus. The existence of this state is disputed.

4F state involves robust movements of the body along with movements of eye and heart rate variability. 1F and 2F are the usual places for fetus to stay.

At 38 weeks, 75 percent will be in duration of these two states. These behavioural states particularly 1F and 2F, which correspond to silent sleep and active sleep have been helpful in assessing fetal behaviour. Tests for monitoring fetal heart rate were employed if sonographic pictures were unusual. Pregnancy outcomes were not much affected by decreased fetal movement until and unless maternal comorbidities were associated.

- **Epidemiology – rate or incidence or prevalence – regional, global**

Around 40% of women who are pregnant are worried about DFM one or more times during pregnancy. 4-15% of pregnant women will contact their obstetrician because of persistent reduced fetal activity in the last trimester.[12,23,24] Stillbirths accounts around 2.6 million deaths globally every year. [25]

Reduced fetal movements occur in 15 % of pregnancies. It leads to 6.1 % of the workload of acute maternity assessment services. Around 55 % of pregnant women who have a stillbirth note a decline in fetal movement prior to the diagnosis.[14]

- **Types of fetal movements**
  - Respiratory movement
  - Simple movement- kick or limb movements
  - Rolling movement- due to change in position
  - Hiccough like movement
  - Others like suckling the thumb or blinking

● **Etiology,**

Early gestation, decreased amniotic fluid volume, obesity, anterior placenta, smoking , fetal sleep state and nulliparity are the factors that can cause decreased fetal movements. [5]

Causes of less fetal activity[26]

a)   Maternal anxiety

b)   Busy mother

c)   Alcohol use

d)   Sedative use

e)   Corticosteroids

f)   Fetal sleep

g)   Intrauterine growth retardation

h)   Hypoxia

i)   Hypothyroidism

j)   Fetal anemia

k)   Neurological or muscular abnormality

l)   Poly- or oligohydramnios

● **Pathophysiology,**

Normal number and character of fetal movement and other kinds of fetal biophysical activity   ensures the functional integrity of mechanism of fetal regulation. When these mechanisms are subjected to mild hypoxemia, DFM is believed to represent a compensatory fetal behavioral response, analogous to the compensatory physiological response of redistribution of blood flow to essential organs. As hypoxemia becomes more severe and prolonged, compensatory responses can fail to

● **Etiology,**

protect the fetus, leading to fetal injury or death. Perception of DFM by the mother is an indicator for pregnancies at high risk of adverse outcomes.

FIGURE : Sequence of fetal response to stress

Sequence may vary according to the etiology and progression
Stress
Chronic respiratory and nutritive insufficiency

Primary adaptive response
Decreased fetal growth rate

Secondary adaptive response
Fetal energy conservation
   Decreased fetal movement
   Decreased fetal heart rate reactivity
Circulatory redistribution
   Falling cerebral flow impedance
   Rising umbilical and aortic impedance
Fetal growth preferred over placental growth
Increased efficiency of placental exchange
Polycythemia
   Greater O_2 carrying capacity

Progressive decompensation
Hypoxia → respiratory acidosis → metabolic acidosis
High impedance in fetoplacental and systemic circulation results in
   absent end diastolic flow in umbilical arteries
Declining amniotic fluid volume → oligohydramnios
Loss of fetal movement
Loss of fetal heart rate reactivity and variability
Persistent late decelarations
Agonal pattern

Death

- **Diagnosis – different methods to count fetal movements**

Table: Formal fetal movement counting descriptions [27]

Method	Description
Cardiff Method	A method of counting fetal movements where a woman monitors the first 10 movements and indicates when the movements were felt
Modified Cardiff Method	Women were to record the time taken to feel 10 fetal movements on a modified Cardiff 'count-to-10' chart.

	Women had to count as early in the day as was convenient for them. Women were counting fetal movements daily on a modified 'count-to-10' chart indicating the time required to experience 10 consecutive movements. All women were to count in the evening
Sadovsky Method	Women were requested to count the first 4 movements after each meal, indicate each movement with an X and stop counting
Fetal Movement Chart	Fetal movements are recorded during 30 minutes post meals and prior to bedtime at night. 10 or more fetal movements per day are considered normal
'Count-to-ten' chart	A chart that a woman uses to record the number of times and the times her baby moved
Hormone analysis	Oestriol and human placental lactogen were measured by radio-immunoassay at 33, 36, 39 and 41 weeks of pregnancy and from then twice a week.

● **Management .**

History [28]

1. History of reduced fetal activity – Duration, pattern and intensity of fetal movements felt and any previous presentations with reduced fetal activity.

2. Other symptoms – Such as the abdominal pain, contractions, PV bleeding or fluid loss, headaches, blurred vision, itchy hands or feet.

3. Maternal lifestyle and medical history- Including smoking, alcohol or medication use (like benzodiazepines, methadone)

4. Screen for risk factors for stillbirth: Previous stillbirth, previous history of decreased fetal movements, intrauterine growth restriction, increased maternal BMI ≥ 25, previous preterm birth, smoking, IVF pregnancy, small for gestational age, nulliparity or parity ≥3, pre-existing diabetes, hypertension, antepartum haemorrhage, indigenous ethnicity, low socioeconomic status, advanced maternal age and illicit drug use.

Examination

1. Perform baseline maternal observations

2. Perform urinalysis (mainly for proteinuria)

3. Perform a blood sugar level if diabetic, unwell or less dietary intake.

4. Perform an abdominal assessment which consists of measurement of symphysio-fundal height, fetal lie and presentation, uterine tone assessment, palpation for uterine contractions or fetal activity, and determination of amniotic fluid volume.

5. Auscultate the fetal heart – if under 28 weeks with a handheld Doppler, while if over 28 weeks commence fetal monitoring

6. If ≥38 weeks gestation and aiming for a vaginal birth then consider a vaginal examination for calculation of a Bishop score.

CTG assessment

Fetal heart action can be best detected by keeping the transducer on a pregnant woman's abdomen. Variations in the signals of ultrasound will be made before fetal heart rate is printed on to monitor paper. Reflected ultrasound signals from moving

fetal heart valves are analysed through a microprocessor that compares incoming signals with the most recent previous signal. This process is helped by the fetal heart rate's regularity. The fetal heart rates are summed for their average values, and a five-beat-per-minute rise throughout a 10-minute segment is considered. The fetal heart rates are added for their mean values and is considered as increase of five beats per minute during a 10-minutes segment. The definition of base value is defined as minimum 2 minutes window or prior 10-min window. Normal FHR baseline is 110–160 bpm and tachycardia refers to FHR > 160 bpm and bradycardia is FHR < 110 bpm. Variability is visually quantified as the amplitude of peak-to-trough in bpm.

NICE GUIDELINES 2019

Feature	Baseline (bpm)	Variability (bpm)	Decelerations	Accelerations
Reassuring	110-160	≥ 5	None	Present
Non-reassuring	100-109 161-180	< 5 for 40-90 minutes	Typical variable decelerations with over 50% of contractions, occurring for over 90 minutes Single prolonged deceleration for up to 3 minutes	The absence of accelerations with otherwise normal trace is of uncertain significance
Abnormal	< 100 > 180 Sinusoidal pattern ≥ 10 minutes	< 5 for 90 minutes	Either atypical variable decelerations with over 50% of contractions or late decelerations, both for over 30 minutes Single prolonged deceleration for more than 3 minutes	

If the gestation is > 28 weeks and the CTG is:

1. Normal with no element of risk for fetal growth restriction/ stillbirth and the woman is able to perceive the fetal movements well, then reassure her and notify the obstetrician. She can be discharged and counselled regarding continuing her antenatal care with usual health care provider.

2.   Normal with risk factors: If symphysio-fundal height is reduced (>2cm) or DFM persists, an ultrasound scan is performed.

If the gestation is < 28 weeks:

1.   Confirm the fetal heart is present by auscultation, discuss further treatment with the obstetric staff, and then arrange for an ultrasound assessment consisting   documentation of fetal activity, amniotic fluid index   and Umbilical Artery Doppler.

2.   If there is significant delay in obtaining an ultrasound (> 1 hour) then, CTG must be performed.

3.   Abnormal: Arrange urgent consultant review and an ultrasound

Ultrasound

An ultrasound should be performed:

1.   If the women continue to perceive decreased fetal movements

2.   There have been previous presentations with decreased fetal movements

3.   There are concerns regarding fetal growth restriction

4.   If other stillbirth risk factors are present

5.   The CTG is not acceptable

Ultrasound assessment consists of

1.   Biophysical profile score

2.   AFI and umbilical artery Doppler

3.   Fetal growth

4.   Fetal morphology

If the AFI is normal along with normal UA Doppler and fetal activity on the scan, then the pregnant woman can go home after a consultation with the consultant. Whereas, If the AFI is reduced, elevated systolic/diastolic ratio or inactive fetus on scan, then commence a CTG and arrange an urgent medical review by the consultant.

BIOPHYSICAL PROFILE

Manning and colleagues (1980) showed usage of 5 fetal biophysical variables as a more accurate means of assessing fetal health than a single element. Typically, these tests require 30 to 60 minutes of examiner time. There are the five fetal biophysical components assessed: (1) heart rate acceleration, (2) breathing, (3) movements, (4) tone, and (5) amniotic fluid volume. A score of 2 each is given for normal variables, and abnormal variables were given a count of 0. Thus, the maximum total possible for a healthy fetus is 10. Biophysical score of 0 was nearly always linked with significant fetal acidosis, whereas a normal score of 8 or 10 was associated with normal ph. An equivocal test result a sum of 6 was a poor predictor of abnormal outcome. As the abnormal score decreased from 2 or 4 down to a very abnormal score of zero, this was a progressively more accurate predictor of abnormal fetal outcome. Because the biophysical profile in labor is intensive and requires a person trained in sonography, a vibroacoustic nonstress test was performed twice weekly and combined with amnionic fluid index determination for which < 5 cm was considered abnormal. This abbreviated biophysical profile required approximately 10 minutes to perform, and it was finalised as a better antepartum surveillance method because there were no unexpected fetal deaths.

FETOMATERNAL HEMORRHAGE

The introduction of fetal blood into the maternal circulation before or during birth is referred to as fetomaternal haemorrhage.. Antenatal fetomaternal hemorrhage is a pathological condition with a wide spectrum of clinical variation. The most common antenatal finding is decreased fetal activity and a raise in suspicion is warranted in cases of persistent maternal sensation of less fetal movements by the mother. Fetomaternal hemorrhage is detected by Kleihauer Betke test.

Urgent Kleihauer testing should be performed in the following scenarios:

1. Decreased fetal movements with two consecutive non-reactive or abnormal CTGs and a quiet fetus on ultrasound

2. Significant maternal abdominal trauma with a non-reassuring CTG and a quiet fetus on ultrasound.

3. Sinusoidal fetal heart rate trace in a non-immunised woman

1. **Antenatal risk factors related to less fetal movements**

Dutton PJ et al[29] conducted a study, which demonstrated a significant connection between poor pregnancy outcome and the total movements felt during the fetal heart rate trace, abnormal FHR trace, diastolic blood pressure, estimated fetal weight, liquor volume, serum hCG and hPL.

Constitutionally small babies and In vitro fertilization are usual risk factors for poor neonatal outcome in women with reduced fetal movements. [30,31] Preterm birth, oligohydramnios, fetal growth limitation, and stillbirth can all be indicators of reduced fetal movements. [25]

Two studies conducted by Saastad E et al [31,32] reported that the reduced fetal movements in pregnancy can result in increased perinatal mortality, increased need for emergency delivery and low neonatal Apgar score. Fretts RC et al.[33] conducted a prospective, population-based study of 2313 singleton pregnancies in third trimester with DFM; majority of the fetuses were dead at the time of presentation. 22% of 3rd trimester DFM was associated with poor outcomes, such as impaired fetal growth, preterm birth, neonatal depression and emergency delivery.[29,34]

Table: Factors associated with pregnancy and their consequences related to less fetal activity [5]

Pregnancy factors associated with DFM –

1. Oligohydramnios
2. Threatened preterm labour
3. Fetomaternal transfusion
4. Intrauterine infections
5. Fetal growth restriction
6. Small for gestational age
7. Placental insufficiency

Consequences of decreased fetal movements-

1. Induction of labour
2. Preterm birth
3. Low birth weight
4. Perinatal brain injury
5. Low APGAR acore
6. Hypoglycemia
7. Neurodevelopmental delay
8. Perinatal death
9. Neonatal death

2.   **Perinatal outcome in mother's who perceive less fetal movements**

Intrauterine growth restriction is identified as a major risk factor leading to poor neonatal prognosis in women perceiving reduced fetal movements. Early recognition of decreased fetal movement can help to identify the fetuses that may be compromised. It could also benefit from intervention, by delivering the fetus and thereby prevent in possible progression to fetal/neonatal morbidity.[35-37] When compared to women who had normal movements during pregnancy, the chance of late stillbirth is higher in women who had RFM.[30,38,39]

Figure: Algorithm For Mangement Of Reduced Fetal Movements.[5]
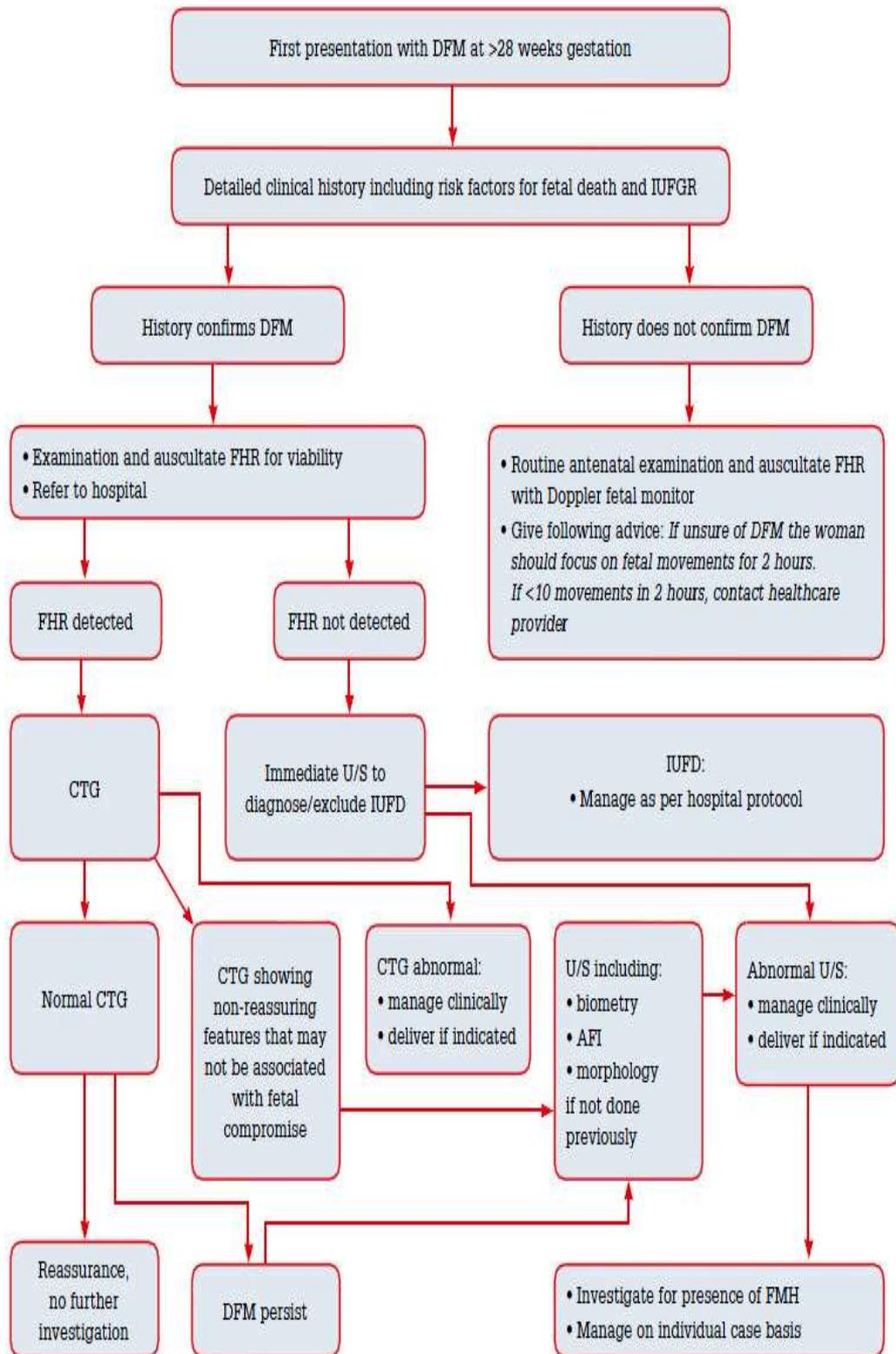
MOST RELEVANT STUDIES:

Nandi N, et al.,[18] conducted a study in pregnant women. The goal of the study was to recognize pregnant women perceiving reduced fetal movements, assessing them to recognize any risk factor, and to investigate them to know the relation with perinatal outcome..   Majority of the participants who presented with less fetal movement were between the age group of 20-30 years(73%), Primigravida(80%) and 72.5% were term. Anteriorly placed placenta was identified in 62% of cases. Risk factors were noticed in 48.75% of women. LBW was reported in 21.25% and majority of the neonates were identified with low Apgar score. This study concluded that the pregnancies with less fetal activity should be monitored properly and thoroughly investigated for risk factors.

Perlitz Y, et al.,[40] performed a retrospective study in 70 pregnant women. The aim of the research was to identify the pregnancy and newborn outcome in a group of hospital admissions of women with diminished fetal activity. It included 3 groups, women with DFM diagnosis who were hospitalized and delivered following the same event (group A) and 70 other hospitalized pregnant women with the same diagnosis, evaluated, discharged home and delivered later on (group B). These 2 DFM groups were compared to a control (group C). The study concluded that high risk pregnancy, poor pregnancy outcome rates, cesarean section , rates of admission to NICU were higher in the decreased fetal movement group as compared to the control group. The study concluded that concern of DFM is more in high risk pregnant women and is a threat for poor pregnancy outcome.

Heazell AEP, et al.,[39] conducted a study in which the pregnant women who reported increased activity in the last 2 weeks had decreased risk of late stillbirth. Whereas, the women with decreased number of fetal movements had increased risk.

Adnan Rashed H, et al.,[41] conducted a study in 100 women. The study's purpose was to determine the outcome of low-risk term pregnancies with less fetal activity. The study's findings revealed that the percentage of caesarean section for fetal distress was 45.8% in case group and 29.4% in control. Adverse perinatal outcomes like birth asphyxia(24%), meconium aspiration syndrome(16%), seizures(10%) and early neonatal death(6%) were identified in case group. According to the results of this research, diminished fetal movement is a major cause of perinatal morbidity and mortality.

McCarthy CM, et al.,[14] conducted a prospective study. The study's aim was to determine the outcome of newborns in reduced fetal movements. Around 26.5 % women were admitted with complaints of less fetal activity while 79.4 % were delivered on their first visit with DFM.

M S, et al.,[42] performed a study in 729 cases. The goal of the research was to identify the relation between the mother's sensation of lessened fetal movements and fetomaternal factors in normotensive singleton pregnancies. Decreased fetal movements were associated with maternal employment, women not having daily exercise and maternal supine position. This study concluded that around 8.1% of pregnancies with less fetal movements had a good outcome.

Turner JM, et al.,[43] conducted a study in 1,01,597 pregnant women. The goal of the study was to identify the consequence of women having less fetal activity in the last trimester of pregnancy. Decreased fetal movements was identified in 8.7% of women whereas, it was absent in 91.3%. Younger age, nulliparous, previous history of stillbirth were identified more in pregnancies with diminished fetal movement when analyzed with women without diminished fetal movement. Higher percentage of planned early term birth, induction of labour and emergency cesarean delivery were linked to diminished fetal movement. This study concluded that the presence of decreased fetal movement is a sign associated with increased threat to a fetus.

Dutton PJ, et al.,[29] performed a prospective study in 305 women. The goal of the research was to see if there were any indications of poor perinatal outcome when the mother perceived less fetal movements. 22.1% of pregnancies with reduced fetal movements resulted in poor perinatal outcome. An independent association was recognized between the fetal heart rate trace, diastolic blood pressure, estimated fetal weight centile and log maternal serum hPL and pregnancy outcome. hPL was related to placental mass. This study decided that the poor perinatal outcome after maternal perception of reduced fetal movement is related to factors which are connected to placental abnormality.

Sterpu I, et al., [25] performed a retrospective investigation. The goal of the study was to identify the end result of pregnancies with less fetal movements. Women with reduced fetal movements had a poor newborn outcome (6.2 % to 18.4%). Poor neonatal outcome (6.2% to 18.4%) was seen in women with decreased fetal movements. Majority of poor neonatal outcomes were identified in women with a small-for-gestational-age fetus (18.4%). The groups with small-for-gestational-age

fetuses in nulliparous and multiparous mothers had the highest risk of poor neonatal outcomes.

Dhungana PR, et al.,[44] conducted a hospital based, prospective comparative study in 200 cases. The goal of the study was to identify the feto-maternal outcome in women with decreased fetal movements. Oligohydramnios (16%) and polyhydramnios(3%) were identified among women with less fetal movements . Whereas, non- reassuring CTG and abnormal heart rate were identified in 5% and 4% of cases respectively. There was significant difference in neonatal complications requiring nursery admission 16% versus 7% (p=0.031) among decreased versus good fetal movement cases respectively. According to the findings of this study, reduced fetal activity is linked to a poor fetomaternal outcome.

Levy M, et al.,[45] conducted a study in 13,338 pregnant women. The goal of the study was to identify the outcomes of low-risk pregnancies complicated by isolated diminished fetal movements at term. Diminished fetal movement was identified in 20.7% of cases. Nulliparity and smoking were higher in the reduced fetal movement group. At admission, the RFM group had increased rates of IUFD (p < 0.001). Relatively unfavourable outcomes in the neonates were identified in the reduced fetal movement group. The study finalized that the women who presented with isolated diminished fetal movement at term had higher rates of IUFD at presentation.

Delaram M, et al.,[46] undertook a randomized controlled experiment with 208 women. The goal of the study was to determine the impact of counting fetal movements on pregnancy outcomes. The results of pregnancy were compared in two groups: counting of fetal movements and control. There was no significant statistical

difference identified in the maternal concern, birth weight, Apgar score and mode of delivery between the two groups. The study concluded that the pregnancy outcome was same in both the groups.

Aduloju O, et al.,[47] conducted a case control study on 1439 women. The study's goal was to identify perinatal outcomes and risk variables in women who had less fetal activity. The prevalence of reduced fetal movements was 12.3% in the study population. Preeclampsia, intrauterine growth restrictions, oligohydramnios, caesarean delivery and neonatal admission was noticed to be increased in the decreased fetal movement group. The study results revealed that pregnancies with less fetal movement had higher chances of operative delivery and poor perinatal outcome.

Bradford BF, et al.,[48] performed a study to assess fetal movement pattern and quality and its relation with late stillbirth. Multiple occasions of more vigorous fetal movement, daily perception of fetal hiccups, and increased period of fetal movements were the maternal perception variables associated with lowered risk of late stillbirth . Reduced fetal movement frequency and perception of mild movements of the fetus in the evening were related with more risk of late stillbirth. According to the findings of the study, women with stillbirth are more prone to experience alterations in fetal movements.

Bhatia M, et al.,[49] undertook a retrospective cohort analysis of 591 women. The aim of the investigation was to determine the outcomes and interferences in pregnant women with RFM and to know whether repeated episodes of RFM led to adverse outcomes. Incidence of less fetal movement was found to be 22.6%. Around

46.2% of women reported more than 1 presentation of reduced fetal movement, which was associated with higher induction rates(56%). No significant unfavourable neonatal outcomes were seen in recurrent episodes of RFM. This study concluded that diminished fetal movements and recurrent episodes lead to substantial resource usage and obstetric interference. It showed no proof to indicate that recurrent episodes increased pregnancy risk.

Hayes D , et al.,[50] conducted a meta analysis study.. The goal of the study was to determine the present level of knowledge and practise in lower middle-income countries about the link between RFM and unfavourable pregnancy outcomes. Five out of 19 studies found a link between RFM and stillbirth in low- and middle-income countries. Stillbirth rates were shown to be higher in mothers who had less fetal movements. This study suggested the need of awareness among women in the evaluation of decreased fetal movements.

Syeda R M, et al.,[51] performed a prospective observational study in 50 pregnant women. The goal of the research was to determine the fetal outcome following reduced fetal movements which was monitored by cardiotocograph and Biophysical Profile Score. Non -reactive CTG on admission was 4% whereas it was 42% at time of delivery in women with diminished fetal movements. Majority (40%) of the caesarean sections were emergency due to non-reassuring CTG. 50% of them were low birth weight, whereas 38.46% had meconium stained liquor indicating an unfavorable intra uterine environment. This study concluded that non reassuring CTG at delivery is associated with low birth weight, meconium stained liquor and need for timely obstetric intervention is needed for better maternal and fetal outcome.

Bellussi F, et al.,[52] performed a randomized control trial . The aim was to determine the association of counting fetal movements with perinatal mortality. Reported reduction in fetal movements were monitored by electronic fetal monitoring and ultrasound for evaluation of the health of the fetus. The incidence of perinatal outcome did not differ across the groups. The fetal movement counting group had a 0.54 % (1,252/229,943) perinatal mortality rate, whereas the control group had a 0.59 % (944/159,755). Other perinatal outcomes such as stillbirths, neonatal mortality, NICU admission, and perinatal morbidity showed no significant differences. This study concluded that instructing women who were pregnant had no noticeable improvement in the end results of pregnancy, irrespective of educating the mother about counting the fetal movements.

Pimenta BSO, et al.,[53] conducted a study in 30 women. The goal of the study was to identify the effect of maternal anxiety on the fetal range of motion in later stages of pregnancy. The Beck Anxiety Inventory (BAI) questionnaire was used. Anxiety symptoms were rated as moderate or severe according to the BAI total score. The mean BAI score was 20.8 (SD = 10.2) and the mean time to count 10 fetal movements was identified as 24.3 min (SD = 6.6 min). Numbness , fear of the worst happening, terrified, feeling of choking, fear of losing control and fear of dying were the BAI items which was associated with moderate or severe maternal anxiety. There was a statistically significant negative correlation between the total BAI score and the mean time of 10 perceived fetal movements (p < 0.0001) .This study concluded that the maternal anxiety resulted in increased activity of fetal movements.

LACUNAE OF LITERATURE

Counting of fetal movements by the mother is considered as a popular and valuable evaluating mechanism of fetal wellbeing. The exact cause is unknown in those pregnant women who had decreased fetal movements, but had delivered a healthy newborn. Many studies have to be done in detail to find out the maternal and fetal factors related to maternal sensation of reduced fetal movements. More studies are required to determine the impact of counting fetal movements on critical pregnancy outcomes such as intrauterine fetal death. More research is needed to evaluate current methods and their effectiveness in both detection and long-term effects of diminished fetal movements. Studies in developed countries have evaluated the factors causing threat and the significance of educating women regarding reduced fetal movements, whereas more investigation is required in developing countries. More research is required to find out the most effective screening strategy for women with RFM to identify which women require more intensive surveillance or delivery to prevent intrauterine fetal death.
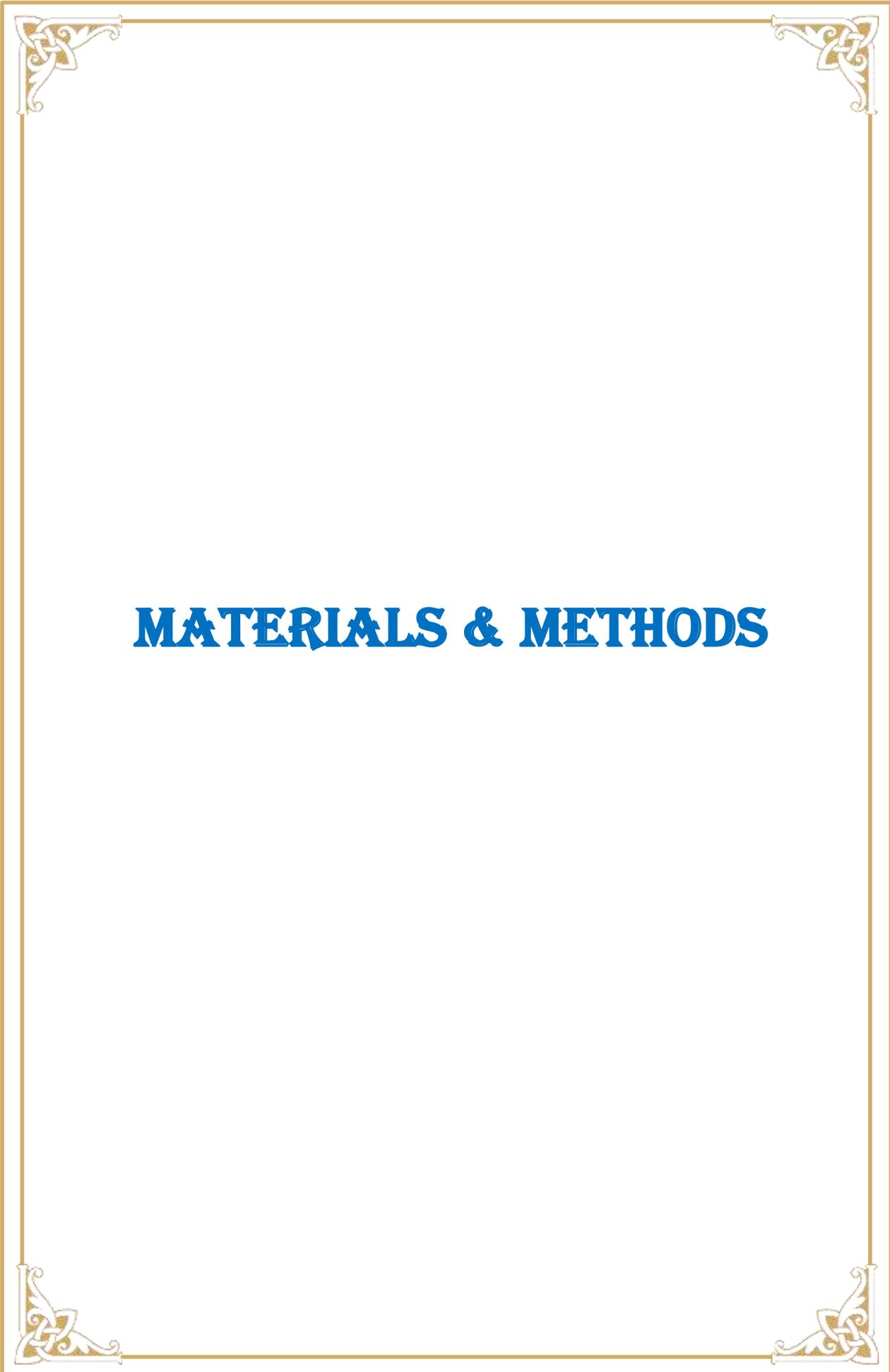
MATERIALS & METHODS

MATERIALS & METHODS

Study site: The current study was conducted in the Department Of Obstetrics and Gynecology at RLJH hospital Kolar.

Study population: All the eligible pregnant women with decreased fetal movements, delivered at RLJH hospital were considered as study population.

Study design: The current study was a prospective observational study.

Study population and Sample size:

Sample size- 100 cases

The sample size is deduced based on the average prevalence of 15% of decreased fetal movements in pregnancies. 15% reference is taken as observed in a study by - Decreased fetal movements in third trimester : what to do?[13] done in the year 2005. Sample size was determined by epi info version 3.0 open source calculator. Observed variance estimate of 95% confidence interval and 7% precision.

● **Sample size calculation:**

FORMULA-

$$n = \frac{(z_{\alpha/2})^2 \times pq}{d^2}$$

Where:

n = sample size

P = percentage

q = 1-p

d = desired degree of precision

Z= is the standard normal value at the level of confidence desired, usually at 95% confidence

Sampling method: All the eligible subjects were recruited into the study consecutively by convenient sampling till the sample size is reached.

Study duration: The data collection for the study was done between January 2020-June 2021 for a period of 15 months.

Inclusion Criteria:

- Singleton pregnant women at term pregnancy with perception of decreased fetal movements.

Exclusion criteria:

- Multifetal pregnancy

- Gross congenital malformations.

- Preterm labour.

Ethical considerations: Study was approved by institutional human ethics committee. Informed written consent was obtained from all the study participants and only those participants willing to sign the informed consent were considered in the study. The risks and benefits involved in the study and voluntary nature of participation were explained to the participants before obtaining consent. Confidentiality of the study participants was maintained.

Data collection tools: All the relevant parameters were documented in a structured study proforma.

Methodology:

A total of 100 antenatal mothers at term pregnancy with perception of decreased fetal movements were included in the study. Written informed consent was

obtained from the antenatal mothers who were willing to participate in the study. Antenatal presentation will be detailed, blood pressure will be recorded, daily fetal movement chart will be assessed, followed by a detailed biophysical profile which includes ultrasound assessment of fetal cardiac activity, fetal tone, breathing movements, amniotic fluid volume and a non stress test. In ultrasound we will also look for placental location and abruption. Finally, deliveries done due to reduced fetal movements or poor biophysical profile and all their poor perinatal outcome like low APGAR score, need for resuscitation, need for NICU admission, stillbirths and intrauterine deaths at the time of presentation were recorded.

STATISTICAL METHODS

Preeclampsia and risk factors were considered as primary outcome variables. Gravida, gestational age, pattern of decreased fetal movements, CTG, biophysical profile, placental location, liquor volume, mode of delivery, perinatal outcome, gender of the baby and birth weight (in kg) were considered as explanatory variables.

For quantitative variables, mean and standard deviation were used, whereas for categorical variables, frequency and percentage were used. Non normally distributed quantitative variables were summarized by median and interquartile range (IQR). Data was also represented using appropriate diagrams like bar diagram, pie diagram and box plots.

All Quantitative variables were checked for normal distribution within each category of explanatory variable by using visual inspection of histograms and normality Q-Q plots. Shapiro- wilk test was also conducted to assess normal distribution. Shapiro wilk test p value of >0.05 was considered as normal distribution.

Categorical outcomes were compared between study groups using Chi square test /Fisher's Exact test (If the overall sample size was < 20 or if the expected number in any one of the cells is < 5, Fisher's exact test was used). Univariate Binary logistic regression analysis was performed to test the association between the explanatory variables and outcome variables. Unadjusted Odds ratio along with 95% CI is presented. Variables with statistical significance in univariate analysis were used to compute multivariate regression analysis. Adjusted odds ratio along with their 95% CI is presented.

P value < 0.05 was considered statistically significant. Data was analyzed by using co Guide software, V.1.03
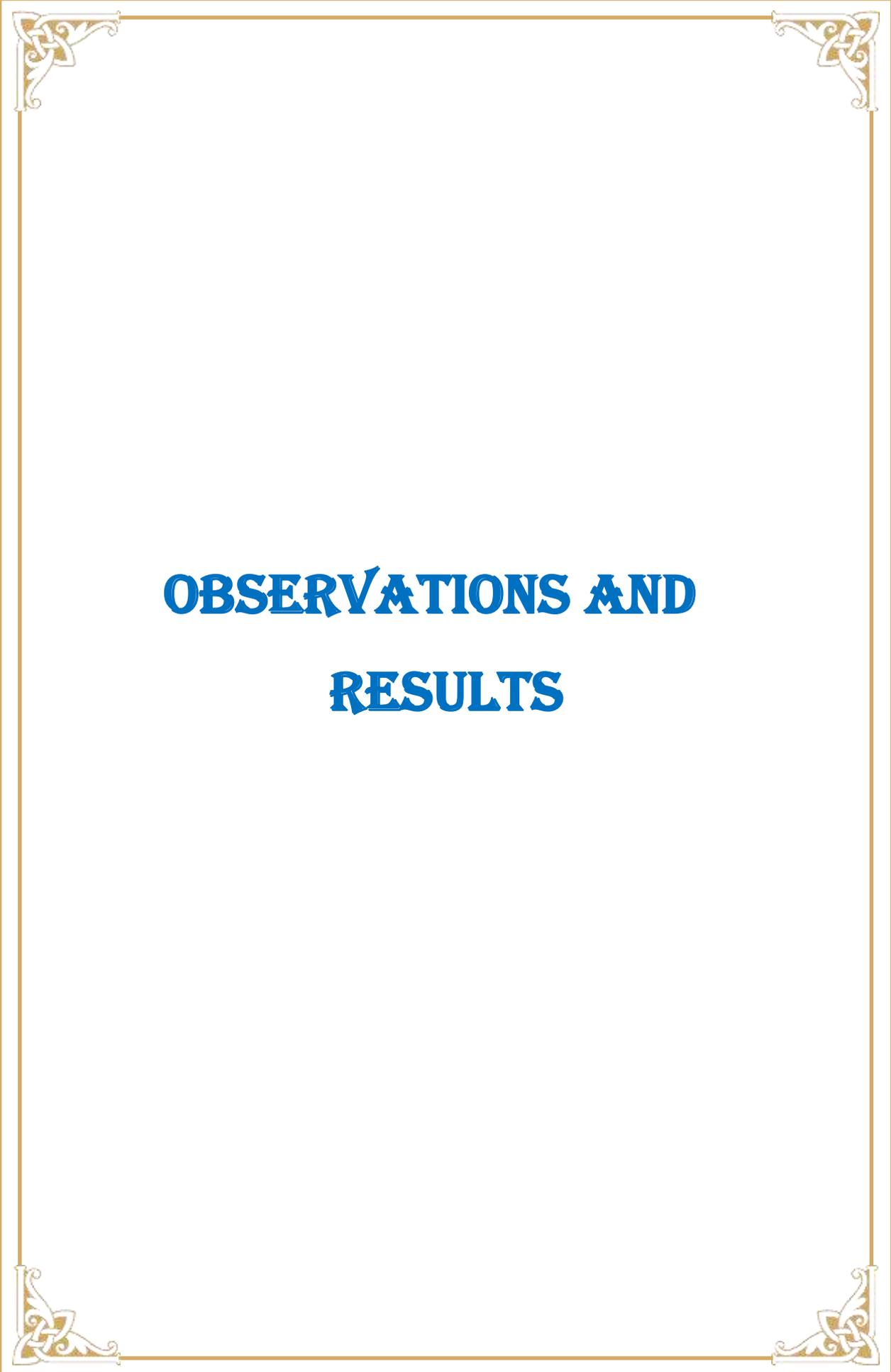
OBSERVATIONS AND RESULTS

RESULTS

A total of 100 people took part in the final analysis.

Table 1: Descriptive analysis of age in study population (N=100)

Age (In Years)	Frequency	Percentages
18 to 20	13	13.00%
21 to 25	48	48.00%
26 to 30	29	29.00%
31 to 35	5	5.00%
>35	5	5.00%

Out of 100 participants, 13(13%) participants belonged to age group 18 to 20 years, 48(48%) participants belonged to age group 21 to 25 years, 29 (29%) participants belonged to age group 26 to 30 years, 5(5%) participants belonged to age group 31 to 35 years and 5(5%) participants belonged to >35 years age group. (Table 1 & figure 1)

Figure 1: Bar chart of age (in years) in the study population (N=100)
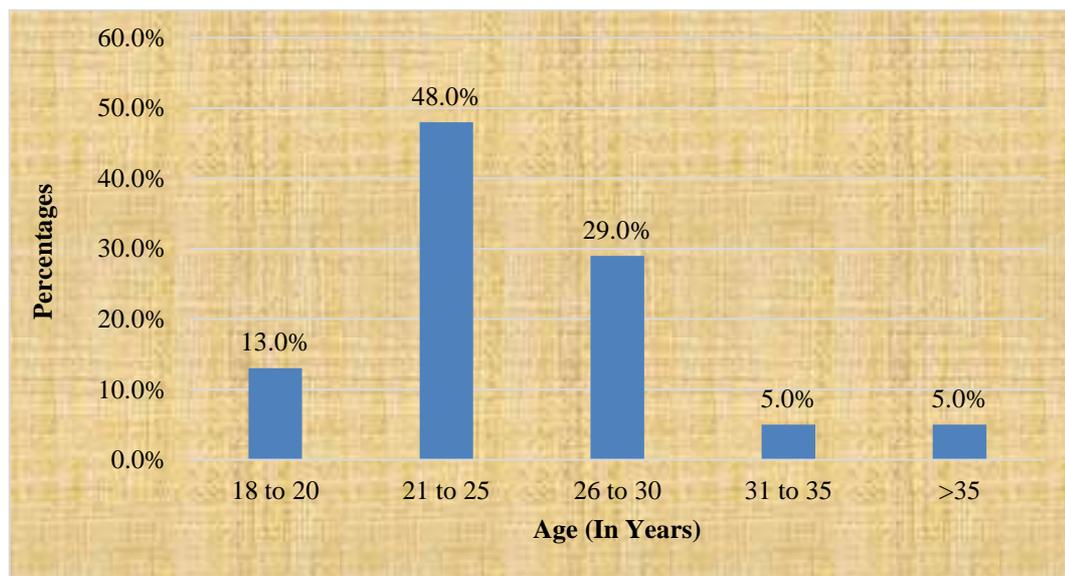
Table 2: Descriptive analysis of gravida in the study population (N=100)

Gravida	Frequency	Percentages
Primigravida	48	48.00%
Gravida 2	31	31.00%
Gravida 3	17	17.00%
Gravida 4	4	4.00%

Among the study population, gravida was Primigravida for 48(48%) participants, Gravida 2 for 31(31%) participants, Gravida 3 for 17 (17%) participants, Gravida 4 for 4(4%) participants. (Table 2 & Figure 2)

Figure 2: Pie chart of gravida in the study population (N=100)
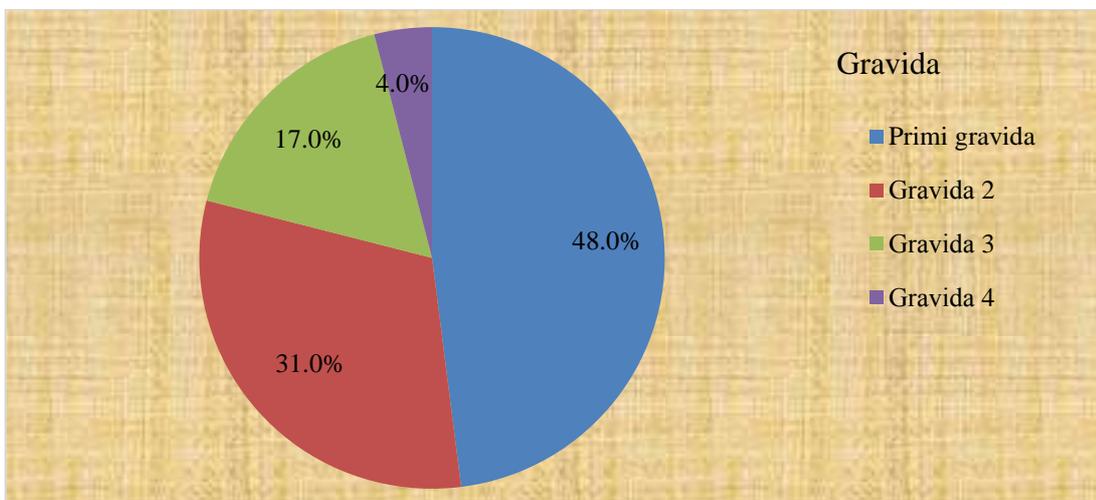
Table 3: Descriptive analysis of gestational age (in weeks)

in the study population (N=100)

Gestational age (in weeks)	Frequency	Percentages
37- 37+6	49	49.00%
38-38+6	22	22.00%
39- 39+6	16	16.00%
40- 40+6	10	10.00%
41- 41+6	3	3.00%

Out of 100 participants, 49(49%) had gestational age 37-37+6 weeks, 22 (22%) participants had gestational age 38-38+6 weeks, 16(16%) participants had gestational age 39- 39+6 weeks, 10(10%) participants had gestational age 40-40+6 weeks, 3(3%) participants had gestational age 41-41+6 weeks.(Table 3 & figure 3)

Figure 3: Bar chart of gestational age (in weeks) in the study population (N=100)
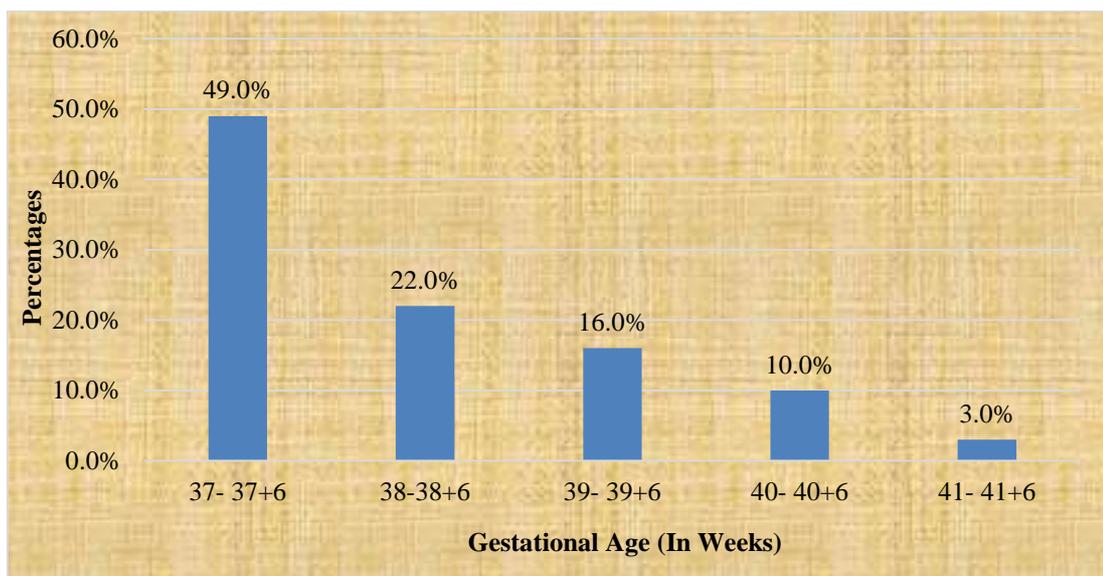
Table 4: Descriptive analysis of maternal risk factors in the study population (N=100)

Maternal Risk Factors	Frequency	Percentages
Preeclampsia	20	20.00%
Rh negative	9	9.00%
Abruptio placenta	8	8.00%
Anemia	8	8.00%
Diabetes mellitus	7	7.00%
Hypothyroidism	7	7.00%
IUGR	5	5.00%
COVID Positive	3	3.00%
None	33	33.00%

Out of 100 participants, maternal risk factor was Preeclampsia for 20(20%) participants, Rh negative for 9(9%) participants, Abruptio placenta for 8(8%) participants, Anemia for 8(8%) participants, Diabetes mellitus 7(7%) participants, Hypothyroidism for 7(7%) participants, IUGR for 5(5%) participants, Covid positive for 3(3%) participants. 33(33%) participants had no maternal risk factors. (Table 4 & figure 4)

Figure 4: Bar chart of maternal risk factors in the study population (N=100)
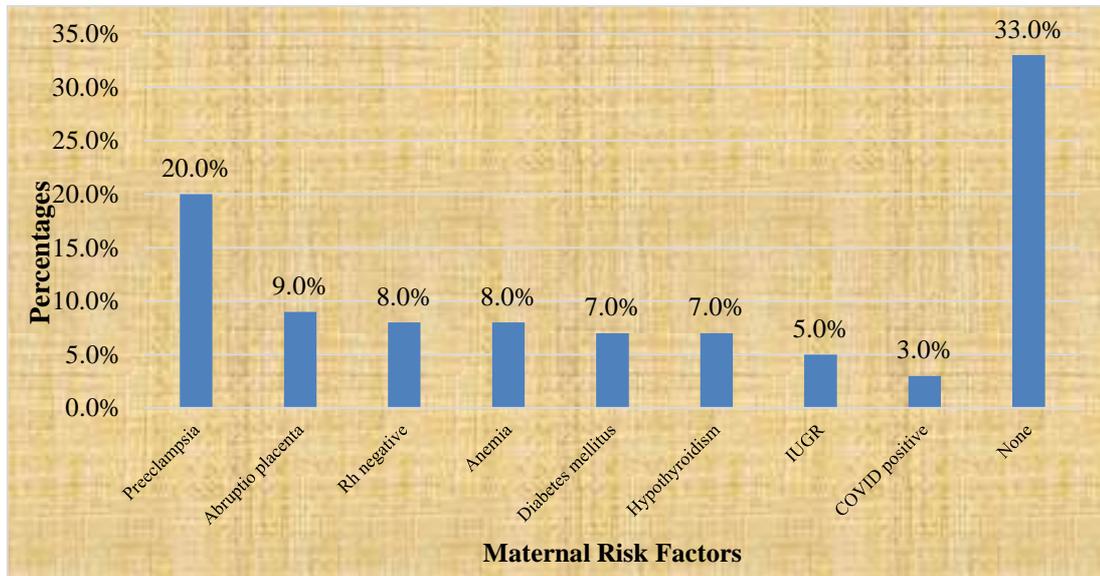
Table 5: Descriptive analysis of pattern of reduced fetal movements
in the study population (N=100)

Pattern of decreased fetal movements	Frequency	Percentages
Frequency	30	30.00%
Intensity	24	24.00%
Both	46	46.00%

Out of 100 participants, 30(30%) participants reported decrease in frequency of fetal movements, 24(24%) participants reported decrease in intensity of fetal movements, 46 (46%) participants had decrease in both frequency and intensity of fetal movements. (Table 5& Figure 5)

Figure 5: Pie chart of pattern of reduced fetal movements in the study
population (N=100)
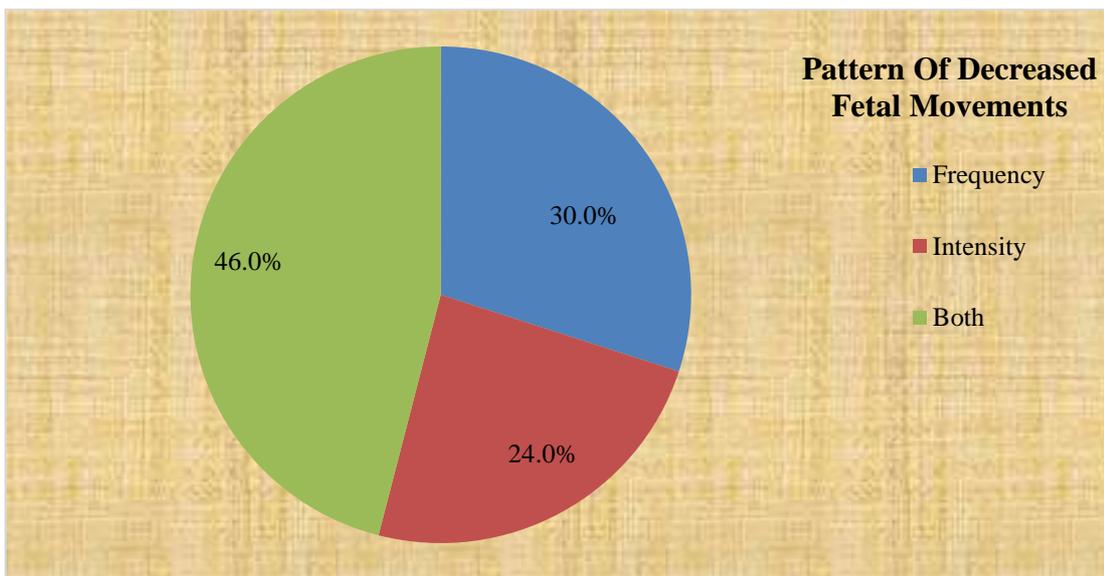
Table 6: Descriptive analysis of CTG in the study population (N=70)

CTG	Frequency	Percentages
Reassuring CTG	42	60.00%
Non-reassuring CTG	25	35.71%
Abnormal	3	4.29%

Out of 70 participants, 42(60%) participants had reassuring CTG, 25(35.71%) participants had non-reassuring CTG , 3(4.29%) participants had abnormal CTG. (Table 6 & Figure 6)

Figure 6: Bar chart of CTG in the study population (N=70)
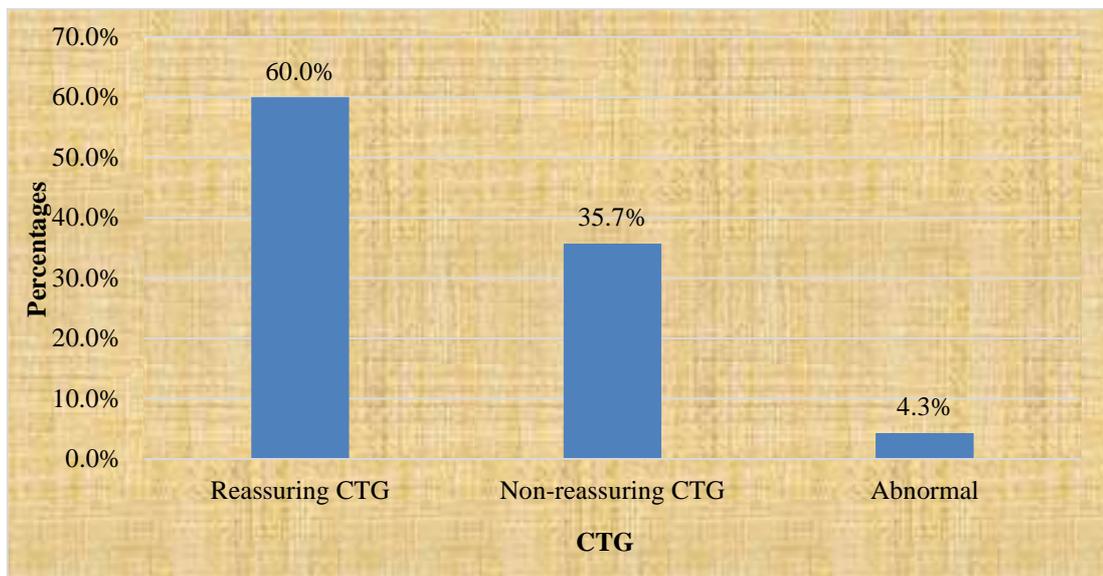
Table 7: Descriptive analysis of biophysical profile in the study population (N=70)

Biophysical Profile	Frequency	Percentages
Normal	59	84.29%
Abnormal	11	15.71%

Out of 70 participants, 59(84.29%) participants reported normal biophysical profile, 11(15.71%) participants reported abnormal biophysical profile. (Table 7& Figure 7)

Figure 7: Pie chart of biophysical profile in the study population (N=70)
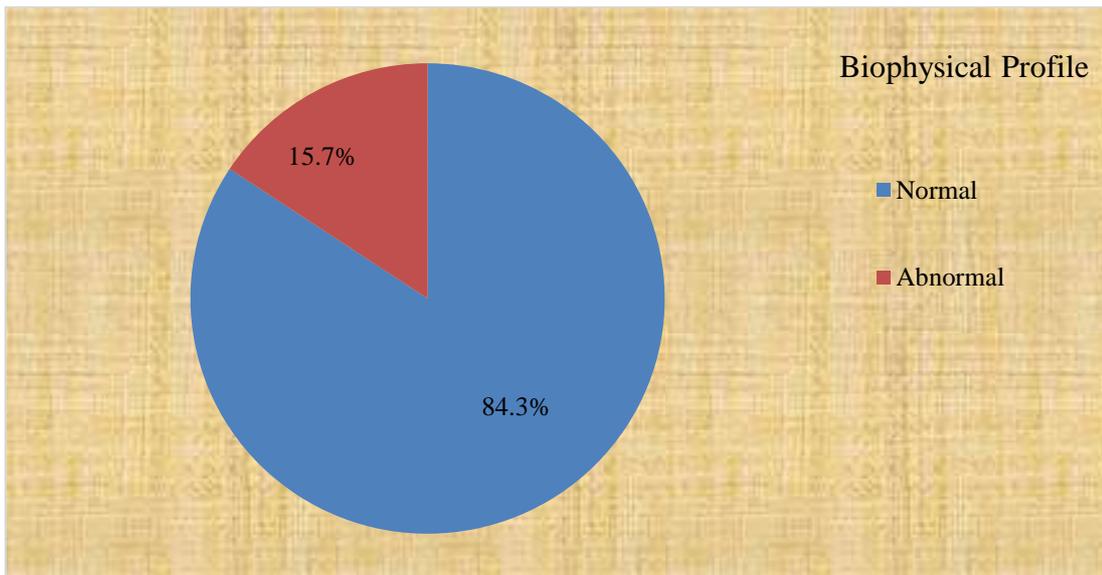
Table 8: Descriptive analysis of placental location in the study population

(N=100)

Placental Location	Frequency	Percentages
Anterior	56	56.00%
Posterior	26	26.00%
Others	18	18.00%

Out of 100 participants, placental location was Anterior in 56(56%) participants, Posterior in 26(26%), Other locations in 18(18%) participants. (Table 8& figure 8)

Figure 8: Bar chart of placental location in the study population (N=100)
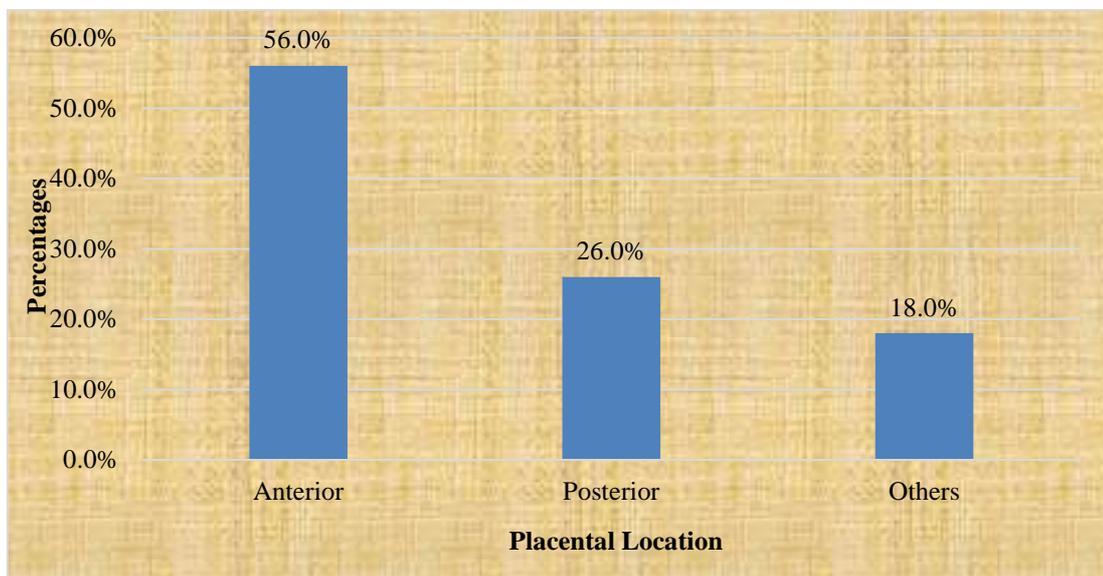
Table 9: Descriptive analysis of liquor volume in the study population (N=100)

Liquor Volume	Frequency	Percentages
Adequate	72	72.00%
Oligohydramnios	21	21.00%
Polyhydramnios	7	7.00%

Out of 100 participants,liquor volume was adequate in 72(72%) participants, Polyhydramnios in 21 (21%) participants, Oligohydramnios in 7(7%) participants. (Table 9 & figure 9)

Figure 9: Pie chart of liquor volume in the study population (N=100)
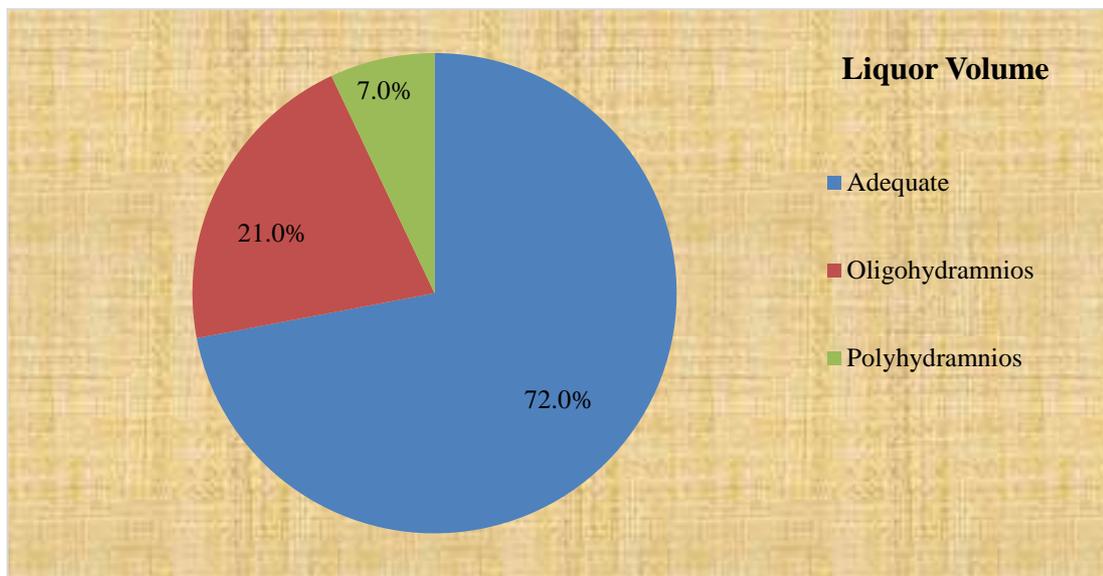
Table 10: Descriptive analysis of mode of delivery in the study population (N=100)

Mode of Delivery	Frequency	Percentages
Vaginal	50	50.00%
LSCS	50	50.00%

Among 100 participants, mode of delivery was vaginal for 50(50%) participants, LSCS for 50(50%) participants. (Table 11 & fig 11)

Figure 10: Pie chart of mode of delivery in the study population (N=100)
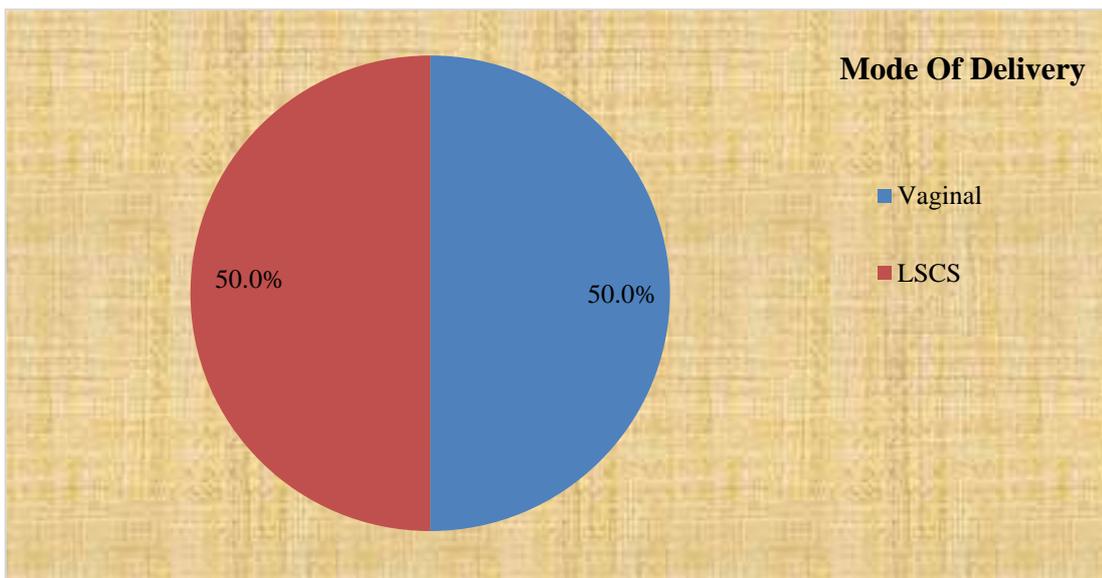
Table 11: Descriptive analysis of perinatal outcome in the study population (N=100)

Perinatal Outcome	Frequency	Percentages
Mother side	43	43.00%
NICU	27	27.00%
IUFD	30	30.00%

Out of 100 participants, the perinatal outcome was Motherside for 43 (43%) participants, NICU admission for 27 (27%) participants and IUFD for 30 (30%) participants. (Table 12 & Figure 12)

Figure 11: Bar chart of perinatal outcome in the study population (=100)
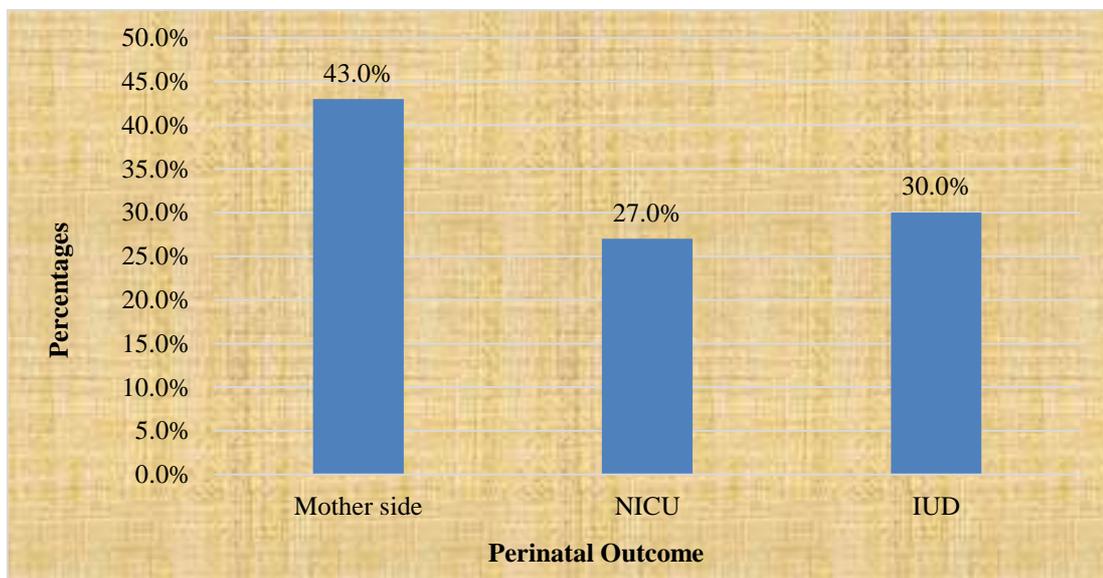
Table 12: Descriptive analysis of APGAR in the study population (N=70)

APGAR	Frequency	Percentages
at 1 mint		
1 to 3	2	2.00%
4 to 6	26	26.00%
7 to 10	42	42.00%
at 5 mints		
1 to 3	0	0.00%
4 to 6	4	4.00%
7 to 10	66	66.00%

42% of the study group depicted normal APGAR score at 1 minute. 66% of the study group depicted normal APGAR score at 5 minutes. (Table 13)

Table 13: Descriptive analysis of gender of the baby in the study population (N=100)

Gender of the baby	Frequency	Percentages
Male	49	49.00%
Female	51	51.00%

Out of 100 participants, gender of the baby was Male in 49(49%) participants and Female in 51(51%) participants. (Table 14 & figure 13)

Figure 13: Pie chart of gender of the baby in the study population (N=100)
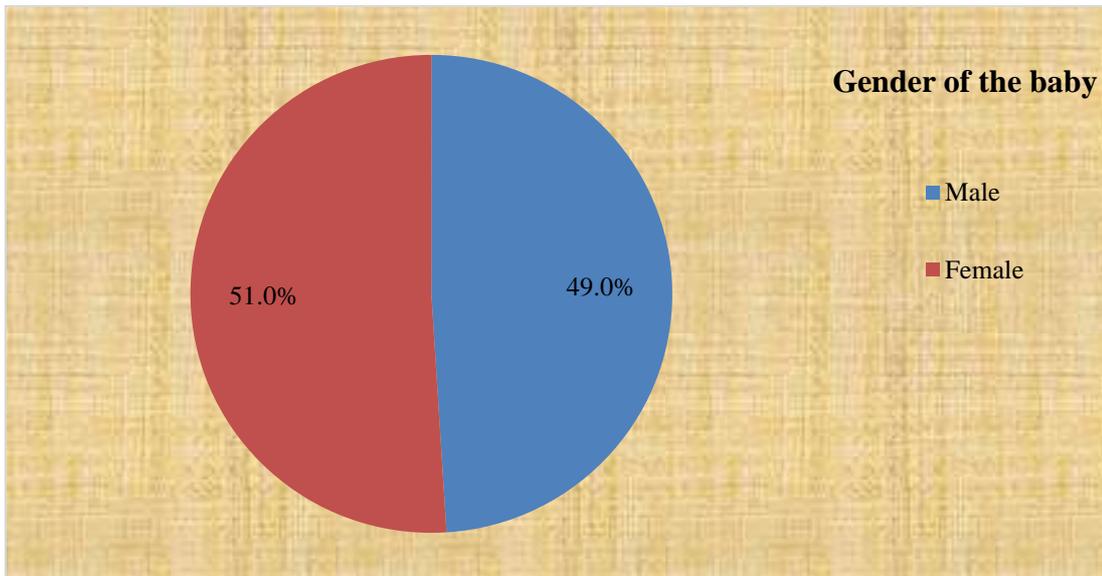
Table 14: Descriptive analysis of birth weight (in kg) in the study population (N=100)

Birth Weight (in kg)	Frequency	Percentages
<2.5 kg	34	34.00%
>=2.5 kg	66	66.00%

Out of 100 participants, birth weight of babies was <2.5 kg in 34(34%) participants and >= 2.5 kg in 66(66%) participants. (Table 15 & figure 14)

Figure 14: Bar chart of birth weight (in kg) in the study population (N=100)
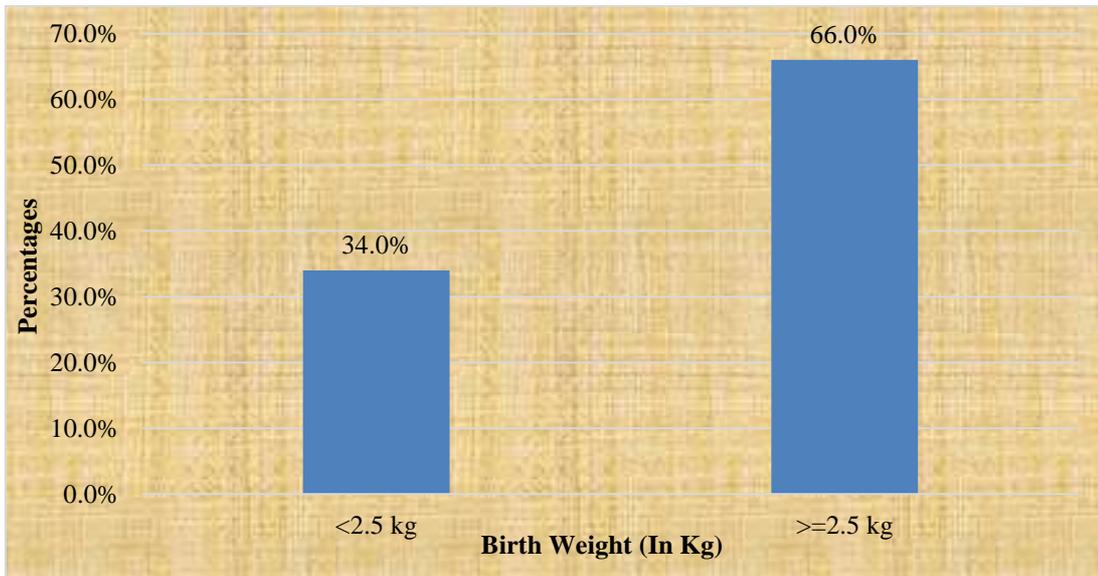
Table 17: Univariate logistic regression analysis of factors associated with preeclampsia in study population (N=100)

Parameters	Preeclampsia		Odds Ratio	P value
	Yes	No	(95% CI)	
Gravida				
Primi (N=48)	8 (16.67%)	40 (83.33%)	(Baseline)	
Multi (N=52)	12 (23.08%)	40 (76.92%)	1.5(0.56 to4.07)	0.425
Gestational age (in weeks)				
37- 37+6 (N=49)	11 (22.45%)	38 (77.55%)	(Baseline)	
38-38+6 (N=22)	6 (27.27%)	16 (72.73%)	1.295 (0.409 - 4.106)	0.660
39- 39+6 (N=16)	2 (12.5%)	14 (87.5%)	0.494 (0.097- 2.510)	0.395
40- 40+6 (N=10)	0 (0%)	10 (100%)	0.000	0.999
41- 41+6 (N=3)	1 (33.33%)	2 (66.67%)	1.727 (0.143 -20.885)	0.667

Pattern of decreased fetal movements

Frequency (N=30)	7 (23.33%)	23 (76.67%)	1.251 (0.410 - 3.821)	0.694
Intensity (N=24)	4 (16.67%)	20 (83.33%)	0.822 (0.225 - 3.009)	0.767
Both (N=46)	9 (19.57%)	37 (80.43%)	(Baseline)	
CTG				
Reassuring CTG (N=42)	7 (17.07%)	35 (82.93%)	(Baseline)	
Non-reassuring CTG (N=25)	7 (28%)	18 (72%)	1.89(0.58 to6.23)	0.296
Abnormal (N=3)	1 (33.33%)	2 (66.67%)	2.43(0.2 to30.63)	0.493
Biophysical Profile				
Normal (N=59)	12 (20.34%)	47 (79.66%)	(Baseline)	
Abnormal (N=11)	3 (27.27%)	8 (72.73%)	1.469 (0.33 to 6.39)	0.608
Placental Location				
Anterior (N=56)	10 (17.86%)	46 (82.14%)	0.57(0.17 to1.95)	0.366
Posterior (N=26)	5 (19.23%)	21 (80.77%)	0.62(0.15 to2.56)	0.508
Others (N=18)	5 (27.78%)	13 (72.22%)	(Baseline)	
Liquor Volume				
Adequate (N=72)	14 (19.44%)	58 (80.56%)	(Baseline)	
Oligohydramnios (N=21)	6 (28.57%)	15 (71.43%)	1.66(0.55 to5.04)	0.373
Polyhydramnios (N=7)	0 (0%)	7 (100%)	0.01(0 to0)	0.999
Mode of delivery				
Vaginal (N=50)	5 (10%)	45 (90%)	(Baseline)	
LSCS (N=50)	15 (30%)	35 (70%)	3.858(1.28 to11.64)	0.017

Perinatal Outcome				
Mother Side (N=42)	9 (21.43%)	33 (78.57%)	(Baseline)	
NICU (N=28)	5 (17.86%)	23 (82.14%)	0.798(0.24 to2.69)	0.715
IUFD (N=30)	6 (20%)	24 (80%)	0.92(0.29 to2.93)	0.883
Gender of the baby				
Male (N=49)	9 (18.37%)	40 (81.63%)	(Baseline)	
Female (N=51)	11 (21.57%)	40 (78.43%)	1.223(0.46 to3.27)	0.689
Birth weight (in kg)				
<2.5 Kg (N=34)	7 (20.59%)	27 (79.41%)	1.057(0.38 to2.96)	0.916
>=2.5 Kg (N=66)	13 (19.7%)	53 (80.3%)	(Baseline)	

Multi gravida (23.08%) were more in pre-eclampsia cases compared to primi gravida (16.67%). During 39 to 41 weeks, pre-eclampsia reported very less compared to other gestational age groups. Less birthweight (20.59%) was observed more in pre-eclampsia patients. The univariate logistic regression analysis had shown statistically not significant association with preeclampsia Status with all explanatory factors as presented in. (Table 17)

Table 18: Univariate logistic regression analysis of factors associated with risk factors in study population (N=100)

Parameters	Risk factors		Odds Ratio (95% CI)	P value
	Yes	No		
Gravida				
Primi (N=48)	27 (56.25%)	21 (43.75%)	(Baseline)	
Multi (N=52)	40 (76.92%)	12 (23.08%)	2.593(1.1 to6.14)	0.030
Gestational age (in weeks)				
37- 37+6 (N=49)	40 (81.63%)	9 (18.37%)	(Baseline)	
38-38+6 (N=22)	14 (63.64%)	8 (36.36%)	0.394(0.13 to1.22)	0.106
39- 39+6 (N=16)	5 (31.25%)	11 (68.75%)	0.103(0.03 to0.37)	<0.001
40- 40+6 (N=10)	5 (50%)	5 (50%)	0.225(0.06 to0.95)	0.042
41- 41+6 (N=3)	3 (100%)	0 (0%)	363481839.642(0 to0)	0.999
Pattern of decreased fatal movements				
Frequency (N=30)	18 (60%)	12 (40%)	0.365(0.14 to1.03)	0.055
Intensity (N=24)	12 (50%)	12 (50%)	0.244(0.09 to0.72)	0.010
Both (N=46)	37 (80.43%)	9 (19.57%)	(Baseline)	
CTG				
Reassuring CTG (N=42)	23 (53.66%)	19 (46.34%)	(Baseline)	
Non-reassuring CTG (N=25)	17 (68%)	8 (32%)	1.836(0.65 to5.2)	0.253
Abnormal (N=3)	2 (66.67%)	1 (33.33%)	1.728(0.15 to20.58)	0.665
Biophysical Profile				
Normal (N=59)	26 (44.07%)	33 (55.93%)	(Baseline)	
Abnormal (N=11)	2 (18.18%)	9 (81.82%)	0.282 (0.056 to 1.420)	0.125

Placental Location

Anterior (N=56)	38 (67.86%)	18 (32.14%)	0.422 (0.108 to 1.646)	0.214
Posterior (N=26)	15 (57.69%)	11 (42.31%)	0.273 (0.063 to 1.178)	0.082
Others (N=18)	15 (83.33%)	3 (16.67%)	(Baseline)	

Liquor Volume

Adequate (N=72)	46 (63.89%)	26 (36.11%)	(Baseline)	
Oligohydramnios (N=21)	18 (85.71%)	3 (14.29%)	3.392(0.92 to12.62)	0.068
Polyhydramnios (N=7)	3 (42.86%)	4 (57.14%)	0.424(0.09 to2.05)	0.285

Mode of delivery

Vaginal (N=50)	38 (76%)	12 (24%)	(Baseline)	
LSCS (N=50)	29 (58%)	21 (42%)	0.437(0.19 to1.03)	0.058

Perinatal Outcome

Mother Side (N=43)	21 (48.84%)	22 (51.16%)	(Baseline)	
NICU (N=27)	19 (70.37%)	8 (29.63%)	2.488 (0.897 to 6.898)	0.080
IUFD (N=30)	27 (90%)	3 (10%)	9.429 (2.483 to 35.803)	0.001

Gender of the baby

Male (N=49)	29 (59.18%)	20 (40.82%)	(Baseline)	
Female (N=51)	38 (74.51%)	13 (25.49%)	2.016(0.87 to4.72)	0.106

Birth weight (in kg)

<2.5 Kg (N=34)	28 (82.35%)	6 (17.65%)	3.231(1.18 to8.87)	0.023
>=2.5 Kg (N=66)	39 (59.09%)	27 (40.91%)	(Baseline)	

The univariate logistic regression analysis had shown statistically significant association with risk factors with many explanatory factors (multi gravida, gestational age 39- 39+6 weeks, 40- 40+6 weeks, the intensity of fatal movement, the perinatal outcome of IUFD, birth weight >= 2.5 kg) as presented in table 16. The strongest association was found with IUFD, compared to the mother side (odds ratio=9.429, 95% CI 2.483 to 35.803, P-value 0.023). (Table 18)
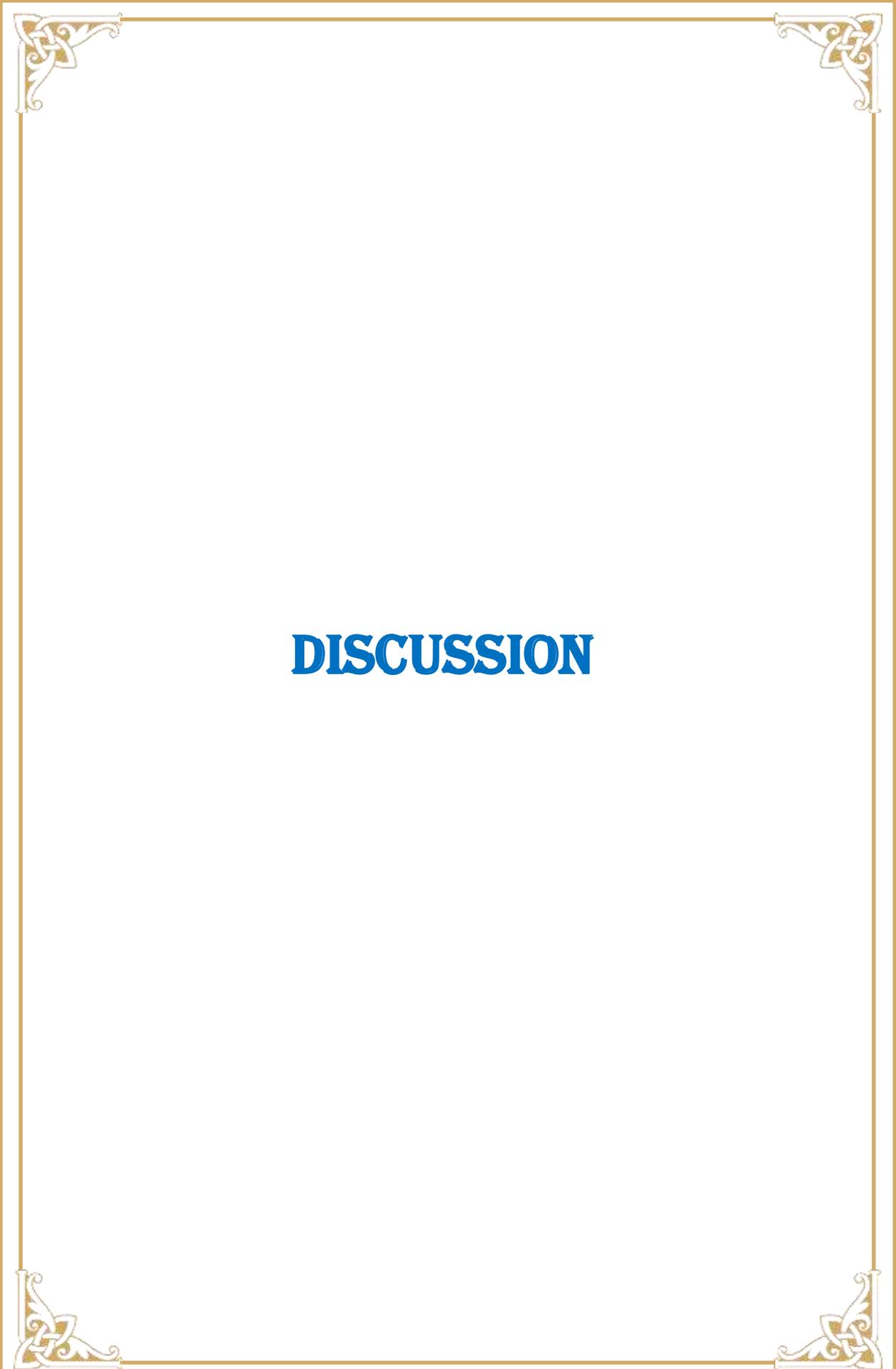
DISCUSSION

DISCUSSION

Fetal movement is a sign of fetal existence and welbeing.[1] The pressure on the abdominal wall produced by gross fetal movement or limb movement causes the mother to perceive fetal movements.. [2] When the expecting mother presents with decreased perception of fetal movements, it causes a state of worry for both obstetrician and the mother. Insufficient assessment of diminished fetal movements can result in catastrophic perinatal outcome. While the majority of these pregnancies and births are simple, it's vital to distinguish the women at risk for poor fetal outcome from the varied group of pregnancies with diminished fetal movements. A proper risk assessment for this population can assist to strike a balance between unnecessary procedures and over-investigation while still ensuring a positive neonatal outcome. The purpose of this study was to investigate the mother's experience of diminished fetal movements throughout term pregnancy, as well as the newborn outcome.

A total of 100 participants were included in the study. Preeclampsia and risk factors were considered as primary outcome variables. Gravida, gestational age, pattern of decreased fatal movements, CTG, biophysical profile, placental location, liquor volume, perinatal outcome, mode of delivery, gender of the baby and birth weight (in kg) were considered as explanatory variables.

In this study, maximum number of pregnant women were in the age group of 21 to 25 years, followed by 26-30 years of age. The majority of participants being in the age group of 21 to 25 years is similar to that observed in similar studies like Nupur Nandi, et al.,[18] in which maximum number of women who came with diminished fetal movements belonged to 20-30 years of age group with 73% followed

by > 30 years with 15%. In another study by Prudvi Rani Podili, et al., [55] majority of the participants were aged between 18-26 years (60.19%). The results were consistent with our study. This describes a subset of pregnant population who are experiencing fetal movements for the first time and are extremely anxious about their pregnancy outcome.

Majority of the participants with reduced fetal movements were Primigravida in the study(48%). This finding of more Primigravida women, perceiving decreased fetal movements is similar to that found in two similar studies. One study is Nupur Nandi, et al., [18] and another is study by Prudvi Rani Podili, et al., [55] in which 80% and 65% were Primigravida respectively.

With 49.00 percent of the women in this study, the gestational age ranged from 37 to 37+6 weeks. The observation was similar to another study conducted by Habtamu Gebrehana Belay, et al.,[3] in which maximum number of the participants belonged to the gestational age of 37-42 weeks with 68.42%. This could be because a majority of pregnant women in their third trimester are taught how to detect fetal movement. They are also told to visit the hospital if they perceive RFM. Maternal education on FM monitoring thus brings most of them to the hospital with RFM.

In the current study multiple antenatal risk factors were identified to be preeclampsia(13%), abruptio placenta(9%), Rh negative(8%), anemia(8%), diabetes mellitus(7%) and IUGR(5%) .In a similar study done by Olusola Peter Aduloju, et al.,[47] many antenatal risk factors were identified like preeclampsia (25.6%), intra uterine growth restriction(16.4%) and gestational diabetes mellitus(9.4%). Preeclampsia was discovered to be the most prevalent prenatal risk factor, which was comparable to the findings of the current study. In our study, 3% mothers who came with RFM were found to be COVID positive.

In our study, 46% of women who were pregnant reported both decrease in frequency and strength of fetal activity, whereas 30% had decreased number and 24% had decreased intensity pattern of fetal activity. The observation was similar in another study conducted by Nupur Nandi, et al., [18] where 46% pregnant women showed both reduction in frequency and intensity of fetal activity, whereas 41% had decreased frequency and 31% had decreased intensity pattern of fetal movements. Reduced fetal movement frequency in the late third trimester is thought to have a terrible fetal outcome.

In the present study, 60% of pregnant women were reported reassuring CTG whereas, 35.71% with non-reassuring CTG and 4.29% with abnormal CTG. In a study conducted by Nupur Nandi, et al.[18], all the participants had normal CTG on admission, which was inconsistent with our study. As a result, mothers who have less fetal movements should be evaluated using a variety of methods to identify fetuses who are at risk.

In this study, 59/70 participants had normal biophysical profile. In a similar study conducted by Nupur Nandi, et al.[18], 67/80 participants had normal biophysical profile. The results were similar in both studies. Hence, indicating multistep approach is required for identifying the cause for diminished fetal movements.

In our study, majority(56%) of the women had anterior placental location followed by posterior(26%). The observation was similar in other two studies conducted by Mahdi Sheikh,et al.,[42] in which majority of the women had anterior placenta (55.9%) followed by posterior (32.2%). Another study by Olusola Peter Aduloju, et al.,[47] the placental site location was identified as anterior in 57.3%, and

posterior in 15.4% . This observation could be related to the aspect that the anterior wall of the uterus has more room for distention in the abdomen than posterior wall or that fetal movement partly relies on sensation in the abdominal wall .

In the current study, majority of the participants had adequate liquor(72%) followed by oligohydramnios (21%) and polyhydramnios (7%). This observation of adequate liquor in pregnant women perceiving lesser movements of the fetus is close to that found in studies like a study done by Mahdi Sheikh,et al.,[42] 92.2% participants had adequate liquor volume followed by polyhydramnios in 3.3% and oligohydramnios in 1.69% participants respectively. In another study by Olusola Peter Aduloju, et al.,[47] 76.1% had adequate liqour, 17.1% had oligohydramnios and 6.8% had polyhydramnios. The quantity of amniotic fluid present in the uterus affects the rate and amplitude of fetal movements. Oligohydramnios and polyhydramnios may lead to reduced fetal movements. But the observation done in most of the studies show majority of women having adequate liquor. This tells that a single factor cannot be established as a cause for diminished fetal movements.

In our study, when women presented with diminished fetal movements at the time of admission, 50 percent had a vaginal birth and 50 percent had LSCS. In a retrospective study done by Irene Sterpu, et al.,[25] 73.2% women had spontaneous vaginal delivery, 6.3% vacuum and 20.6% cesarean delivery. In another study by Prudvi Rani Podili, et al., [55] 49.3% had spontaneous vaginal delivery, 43.3% LSCS and 7.4% instrumental delivery. There is insufficient data to support either vaginal delivery or LSCS as the route of delivery for women with diminished fetal movements. Mode of delivery may probably depend on maternal/obstetrician's

concerns about perinatal outcome. In the current study, among 50(50%) women who underwent caesarean section, 29(58%) had antenatal risk factors.

Perinatal outcome was assessed among women who were pregnant and presented with decreased fetal movements. 27% babies had NICU admissions, 30% were intrauterine deaths. In a study conducted by Poojari VG et al.,[56] 5 out of 210 participants were diagnosed with intrauterine death. All 5 belonged to high risk category. In our study out of 30 intrauterine deaths, 27(90%) were linked to high risk factors. All revealed episodes of RFM for a variable period of time, which they have ignored leading to delay in presentation. 3 babies born to COVID positive women were given motherside.

In the current study, majority had APGAR score at 1 minute as >7 with 42% while, at 5 minutes as >7 with 66%. In Nupur Nandi, et al., [18] study majority of the cases reported APGAR score at 1 minute as >6 with 91.25% followed by <6 with 8.75%.

In this study, majority of the babies were female with 51%. In Mahdi Sheikh,et al., [42] study 62.7% were female babies which resembles to our study results.

In the current research, 66% of babies had birth weight >=2.5 kg and 34% had <2.5kg. In Olusola Peter Aduloju, et al., [47] study the birth weight of the babies were identified as <2.5kg in majority of cases with 63% which was contradictory to our study results.

In this study, most of the mothers who perceived reduced fetal movements had preeclampsia as an antenatal risk factor. This might be as a result of the effect of

utero-placental insufficiency secondary to placental dysfunction in preeclampsia patients. Multigravida (23.08%) were more in pre-eclampsia cases. Low birthweight (20.59%) was observed more in pre-eclampsia participants. Univariate logistic regression showed preeclampsia with all explanatory variables was statistically not significant with reduced fetal movements.

In this study, univariate regression analysis showed statistically significant association of reduced fetal movements with risk factors with many explanatory factors such as multi gravida, 39- 40+6 weeks of gestation, intensity of fetal movement, perinatal outcome of IUFD, birth weight $>=$ 2.5 kg. The strongest association was found with IUFD. (P value<0.023) Hence this study is an evidence that even a single episode of RFM in a pregnancy should be taken seriously. Timely delivery would have prevented most of the perinatal losses. It is said that about 40% women will seek medical help only after perceiving no movements for 24hours. Hence it is important to advice the need for medical help on urgent basis for RFM, and not after a long time nor until they feel no movements.

CORRELATION OF PARAMETERS WITH VARIOUS STUDIES

PARAMETERS	NUPUR NANDI ET AL (2019)	PRUDVI RANI PODILI ET AL (2021)	PRESENT STUDY
MATERNAL AGE	20- 30 years of age (73%)	18- 26 years of age (60.19%)	21- 25 years of age (48%)
PARITY	Primigravida (80%)	Primigravida (65%)	Primigravida (48%)
GESTATIONAL AGE	37- 40 weeks (66%)	37- 40 weeks (67%)	37- 37+6 weeks (49%)
CTG	Reassuring	Reassuring (75.7%)	Reassuring (41%)
PLACENTAL LOCATION	Anterior placenta (62%)	Anterior placenta (28.2%)	Anterior placenta (56%)
PATTERN OF FETAL MOVEMENTS	Both(frequency and intensity) (46%)	-	Both(frequency and intensity) (46%)
APGAR SCORE AT 1 MIN	>6 (91.25%)	>6 (86.4%)	7-10 (60%)
NICU ADMISSION	Less (8.9%)	Less (23.9%)	Less (27%)
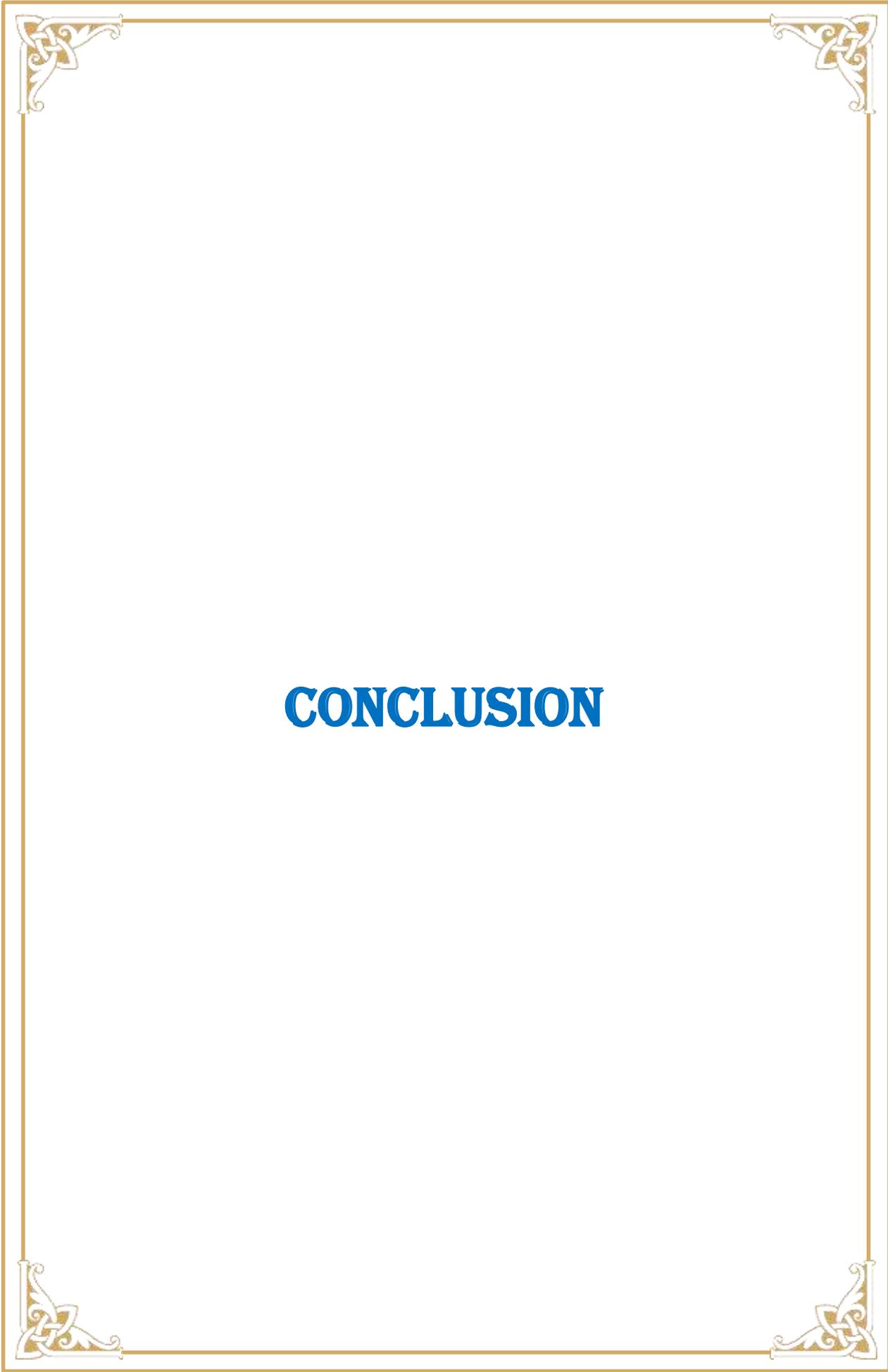
CONCLUSION

CONCLUSION

Every pregnant woman who is anxious about decreased fetal movements should seek medical help. This study shows that there is a connection between risk factors and reduced fetal movements which is proved to be statistically significant. Adverse neonatal outcomes like intrauterine death and NICU admission were recorded.

In most of the developing countries like India, pregnant women have to be educated regarding the importance of counting fetal movements and its poor neonatal outcome. They should be evaluated by detailed history taking, thorough investigation to identify factors causing threat, along with fetal well-being.

Early presentation to the hospital, obstetric evaluation and prompt intervention can prevent adverse neonatal outcome.

LIMITATION

LIMITATION

The main limitation is small sample size and generalization of results require support of evidence from similar large studies. Information regarding the duration of reduction in fetal movements and the elapsed time between the start of the DFM episode and presentation were lacking in the study.

RECOMMENDATION:

This study recommends detailed investigation and timely intervention in women presenting with perception of reduced fetal movements at the earliest for better neonatal outcome.

Further studies can be conducted with larger population size and more information can be collected with respect to the duration from the start of the DFM episode and presentation to the hospital. Few more studies can be done regarding maternal understanding of fetal movements during pregnancy.

SUMMARY

SUMMARY

- Fetal movement is a sign of fetal health and welfare. Counting of fetal movements is a practice of counting and recording baby's movements by a pregnant women in order to track her baby's health. It is described as the maternal sensation of any distinct kick, tremor, waggle or roll. Pregnant women become aware of the fetal movements from 18-20 weeks of gestation and the number of movements per hour varies greatly. Fetal death is frequently signalled by a reduction in fetal movements, which causes a mother to worry. Pregnant women who are worried about the reduction in fetal movement should not wait until the next day for evaluation. Inadequate evaluation of reported diminished fetal movements can lead to a poor neonatal outcome. The current research was conducted to determine the perception of decreased fetal movements by the mother in term pregnancy and its neonatal outcome.

- A total of 100 subjects were involved in the final analysis.

- Majority of the women belonged to 21 to 25 years age group.

- Distribution of gravidity shows majority of incidence among Primigravida.

- Distribution of gestational age showed majority of incidence at 37 to 37+6 weeks .

- Multiple antenatal risk factors were recognized with reduced fetal movements, higher percentage contributed by preeclampsia.

- Most of the women presented with reduction in both intensity and frequency of fetal movements.

- 35.71% had non-reassuring CTG, whereas ultrasound showed abnormal biophysical profile in 15.71% participants.

- Majority of the pregnant women had anterior placental location and adequate liquor.

- The method of delivery was vaginal for 50% participants and LSCS for 50% participants.

- Poor neonatal outcomes like IUFD at presentation was seen in 30% of participants and NICU admissions in 27% of them.

- Majority had normal APGAR score >7 at 1 minute and at 5 minutes .

- Majority of the babies were female with 51%. And 66% of babies had birth weight >=2.5 kg.

- In this study, association of reduced fetal movements with preeclampsia and other explanatory factors is statistically not significant.

- This study also shows that association of reduced fetal movements and risk factors with other explanatory factors is statistically significant.

- The strongest association was found with IUFD. (P value<0.023)
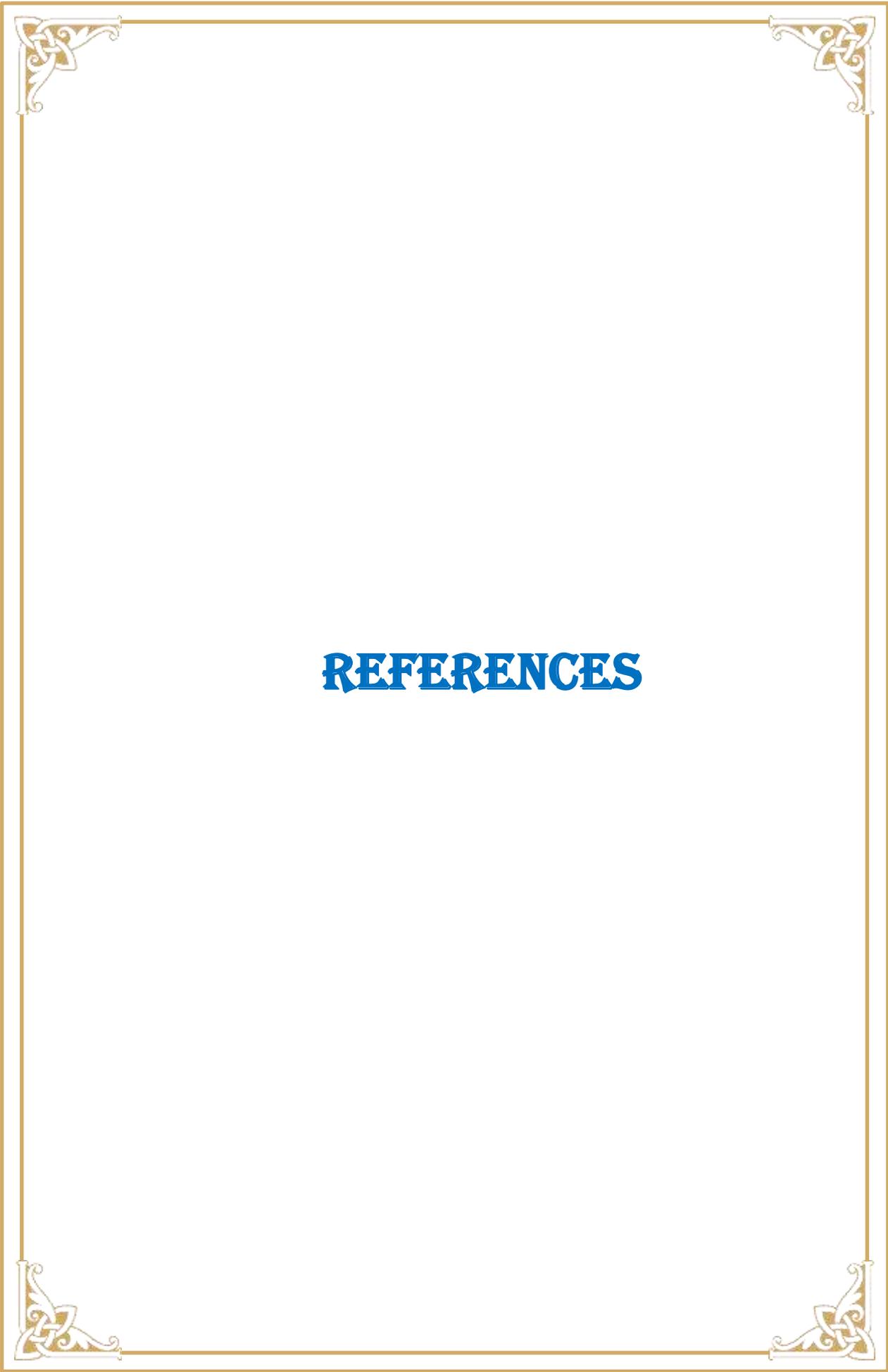
REFERENCES

REFERENCES

1.   Rayburn WF. Fetal body movement monitoring. Obstet Gynecol Clin North Am. 1990;17(1):95-110.

2.   Tuffnell DJ, Cartmill RSV, Lilford RJ. Fetal movements; factors affecting their perception. Eur J Obstet Gynecol Reprod Biol. 1991;39(3):165-167.

3.   Gebrehana Belay H, Tagele Tamiru A, Semahagn AM. Pregnancy Outcomes of Reduced Fetal Movement and its Determinant Factors: A Case Control Study. Clin Mother Child Heal. 2020;17(4):354.

4.   Linde A, Georgsson S, Pettersson K, Holmström S, Norberg E, Rådestad I. Fetal movement in late pregnancy - a content analysis of women's experiences of how their unborn baby moved less or differently. BMC Pregnancy Childbirth. 2016;16(1):127.

5.   Franks Z, Nightingale R. Decreased fetal movements: A practical approach in a primary care setting. Aust Fam Physician. 2014;43(11):782-785.

6.   Neldam S, Jessen P. Fetal movements registered by the pregnant woman correlated to retrospective estimations of fetal movements from cardiotocographic tracings. Am J Obstet Gynecol. 1980;136(8):1051-1054.

7.   Mulder EJH, Derks JB, Visser GHA. Antenatal corticosteroid therapy and fetal behaviour: A randomised study of the effects of betamethasone and dexamethasone. BJOG An Int J Obstet Gynaecol. 1997;104(11):1239-1247.

8.   Pugh EW, Boddy K. Effect of cigarette smoking on fetal breathing movements in normal pregnancies. Br Med J. 1975;1(5957):552-553.

9. Castillo RA, Devoe LD, Ruedrich DA, Gardner P. The effects of acute alcohol intoxication on biophysical activities: A case report. Am J Obstet Gynecol. 1989;160(3):692-693.

10. Robertson SS, Dierker LRJ. Fetal cyclic motor activity in diabetic pregnancies: Sensitivity to maternal blood glucose. Dev Psychobiol. 2003;42(1):9-16.

11. Cito G, Luisi S, Mezzesimi A, Cavicchioli C, Calonaci G, Petraglia F. Maternal position during non-stress test and fetal heart rate patterns. Acta Obstet Gynecol Scand. 2005;84(4):335-338.

12. Frøen JF. A kick from within - Fetal movement counting and the cancelled progress in antenatal care. J Perinat Med. 2004;32(1):13-24.

13. Sergent F, Lefèvre A, Verspyck E, & LM-O gynecology, 2005 U. Decreased active movements of the fetus in the third trimester: what to do? Elsevier. 2015;33(11):681-869. Available from: https://www.sciencedirect.com/science/article/pii/S129795890500322X

14. McCarthy CM, Meaney S, O'Donoghue K. Perinatal outcomes of reduced fetal movements: A cohort study. BMC Pregnancy Childbirth. 2016;16(1):1-6.

15. Grant A, Valentin L, Elbourne D, Alexander S. Routine formal fetal movement counting and risk of antepartum late death in normally formed singletons. Lancet. 1989;334(8659):345-349.

16. Harrington K, Thompson O, Jordan L, Page J, Carpenter RG, Campbell S. Obstetric outcome in women who present with a reduction in fetal movements in the third trimester of pregnancy. J Perinat Med. 1998;26(2):77-82.

17.   O'Sullivan O, Stephen G, Martindale E, Heazell AEP. Predicting poor perinatal outcome in women who present with decreased fetal movements. J Obstet Gynaecol (Lahore). 2009;29(8):705-710.

18.   Nandi N, Agarwal R. Prospective study of maternal perception of decreased fetal movement in third trimester and evaluation of its correlation with perinatal compromise. Int J Reprod Contraception, Obstet Gynecol. 2019;8(2):687-691.

19.   Hofmeyr GJ, Novikova N. Management of reported decreased fetal movements for improving pregnancy outcomes. Cochrane Database Syst Rev. 2012;4(4):CD009148.

20.   Frøen JF, Heazell AEP, Tveit JVH, Saastad E, Fretts RC, Flenady V. Fetal Movement Assessment. Semin Perinatol. 2008;32(4):243-246.

21.   Flenady V, Macphail J, Gardener G, Chadha Y, Mahomed K, Heazell A, et al. Detection and management of decreased fetal movements in Australia and New Zealand: A survey of obstetric practice. Aust New Zeal J Obstet Gynaecol. 2009;49(4):358-363.

22.   Hofmeyr GJ, Novikova N. Management of reported decreased fetal movements for improving pregnancy outcomes. Cochrane Database Syst Rev. 2012;4(4):CD009148.

23.   Frøen JF, Saastad E, Tveit JVH, Børdahl PE, Stray-Pedersen B. [Clinical practice variation in reduced fetal movements]. Tidsskr Nor Laegeforen. 2005;125(19):2631-2634.

24.   Tveit JVH, Saastad E, Stray-Pedersen B, Børdahl PE, Flenady V, Fretts R, et al. Reduction of late stillbirth with the introduction of fetal movement information and guidelines - A clinical quality improvement. BMC Pregnancy Childbirth. 2009;9(1):1-0.

25.   Sterpu I, Pilo C, Koistinen IS, Lindqvist PG, Gemzell-Danielsson K, Itzel EW. Risk factors for poor neonatal outcome in pregnancies with decreased fetal movements. Acta Obstet Gynecol Scand. 2020;99(8):1014-1021.

26.   Olesen AG, Svare JA. Decreased fetal movements: background, assessment, and clinical management. Acta Obstet Gynecol Scand. 2004;83(9):818-826.

27.   Mangesi L, Hofmeyr GJ, Smith V, Smyth RM. Fetal movement counting for assessment of fetal wellbeing. Cochrane Database Syst Rev. 2015;2015(10):CD004909.

28.   Decreased fetal movements Management of. [Cited 2021 Jul.23]. Available from: http://www.stillbirthalliance.org.au/guideline.htm.

29.   Dutton PJ, Warrander LK, Roberts SA, Bernatavicius G, Byrd LM, Gaze D, et al. Predictors of poor perinatal outcome following maternal perception of reduced fetal movements - a prospective cohort study. PLoS One. 2012;7(7):e39784.

30.   Stacey T, Thompson JMD, Mitchell EA, Ekeroma A, Zuccollo J, Mccowan LME. Maternal Perception of Fetal Activity and Late Stillbirth Risk: Findings from the Auckland Stillbirth Study. Birth. 2011;38(4):311-316.

31.   Saastad E, Vangen S, Froøen JF. Suboptimal care in stillbirths - A retrospective audit study. Acta Obstet Gynecol Scand. 2007;86(4):444-450.

32.   Saastad E, Winje BA, Pedersen BS, Frøen JF. Fetal movement counting improved identification of fetal growth restriction and perinatal outcomes - a multi-centre, randomized, controlled trial. PLoS One. 2011;6(12).

33.   Fretts RC. Decreased fetal movement: Diagnosis, evaluation, and management. Wolters Kluwer. 2017;28:1-9.

34.   Frøen JF, Tveit JVH, Saastad E, Børdahl PE, Stray-Pedersen B, Heazell AEP, et al. Management of Decreased Fetal Movements. Semin Perinatol. 2008;32(4):307-311.

35.   Rayburn WF, Kean HEM. Maternal perception of fetal movement and perinatal outcome. Obstet Gynecol. 1980;56(2):161-164.

36.   Goldstein I, Romero R, Merrill S, Wan M, O'Connor TZ, Mazor M, et al. Fetal body and breathing movements as predictors of intraamniotic infection in preterm premature rupture of membranes. Am J Obstet Gynecol. 1988;159(2):363-368.

37.   Whitty JE, Garfinkel DA, Divon MY. Maternal perception of decreased fetal movement as an indication for antepartum testing in a low-risk population. Am J Obstet Gynecol. 1991;165(1):1084-1088.

38.   Heazell AEP, Warland J, Stacey T, Coomarasamy C, Budd J, Mitchell EA, et al. Stillbirth is associated with perceived alterations in fetal activity - findings from an international case control study. BMC Pregnancy Childbirth. 2017;17(1):1-1.

39. Heazell AEP, Budd J, Li M, Cronin R, Bradford B, McCowan LME, et al. Alterations in maternally perceived fetal movement and their association with late stillbirth: Findings from the Midland and North of England stillbirth case-control study. BMJ Open. 2018;8(7):e020031.

40. Perlitz Y, Ben-Shlomo I, Younis J, Ben-Ami M, Badihi R. Pregnancy outcome of women presenting with decreased fetal movements. Obstet Gynecol Int J. 2018;9(4).

41. Adnan Rashed H, Yousif Kellow S. Maternal and neonatal outcome in term low risk pregnancy with reduced fetal movement. WORLD J Pharm Pharm Sci. 2019;8(5):49-71.

42. Sheikh M, Hantoushzadeh S, Shariat M. Maternal perception of decreased fetal movements from maternal and fetal perspectives, a cohort study. BMC Pregnancy Childbirth. 2014;14(1):1-7.

43. Turner JM, Flenady V, Ellwood D, Coory M, Kumar S. Evaluation of Pregnancy Outcomes Among Women With Decreased Fetal Movements. JAMA Netw Open. 2021;4(4):e215071-e215071.

44. Dhungana PR, Adhikari R, Pageni PR, Koirala A. Decreased fetal movement: Is it an alarm to Obstetrician and Pregnant Lady? Med J Pokhara Acad Heal Sci. 2018;1(2):92-97.

45. Levy M, Kovo M, Barda G, Gluck O, Koren L, Bar J, et al. Reduced fetal movements at term, low-risk pregnancies: is it associated with adverse pregnancy outcomes? Ten years of experience from a single tertiary center. Arch Gynecol Obstet. 2020;301(4):987-993.

46.   Delaram M, Jafarzadeh L. The effects of fetal movement counting on pregnancy outcomes. J Clin Diagnostic Res. 2016;10(2):SC22-SC24.

47.   Aduloju O, Olofinbiyi B, … OD-D-AJ of, 2020 U. Outcome of Management of Pregnant Women with Decreased Fetal Movements in a Resource Constrained Setting in Southwest Nigeria. journalajpcb.com. 2020;3(4):8-16. [Cited 2021 Oct.1]. Available from: https://www.journalajpcb.com/index.php/AJPCB/article/view/30124

48.   Bradford BF, Cronin RS, McCowan LME, McKinlay CJD, Mitchell EA, Thompson JMD. Association between maternally perceived quality and pattern of fetal movements and late stillbirth. Sci Rep. 2019;9(1):1-9.

49.   Bhatia M, Mitsi V, Court L, Thampi P, El-Nasharty M, Hesham S, et al. The outcomes of pregnancies with reduced fetal movements: A retrospective cohort study. Acta Obstet Gynecol Scand. 2019;98(11):1450-1454.

50.   Hayes DJ, Smyth RM, Heazell AE. Investigating the significance and current state of knowledge and practice of absent or reduced fetal movements in low and lower middle-income countries: a scoping review. J Glob Heal Reports. 2019;3:2019023.

51.   Syeda.R.M S. Fetal Outcome in Pregnant Women with Reduced Fetal Movements -. Int J Heal Sci Res. 2013;3(7):18-28.

52.   Bellussi F, Po' G, Livi A, Saccone G, De Vivo V, Oliver EA, et al. Fetal Movement Counting and Perinatal Mortality: A Systematic Review and Meta-analysis. Obstet Gynecol. 2020;135(2):453-462.

53. Pimenta BSO, Nomura RMY, Nakamura MU, Moron AF. Maternal anxiety and fetal movement patterns in late pregnancy. J Matern Neonatal Med. 2016;29(12):2008-2012.

54. BDSS Corp. Released 2020. coGuide Statistics software, Version 1.0, India: BDSS corp. Available from: https://www.coguide.in. [Last accessed on 2021 Nov 20].

55. Pallavee P, Podili PR, Samal R, Ghose S. Pregnancy outcomes in women presenting with single versus multiple episodes of reduced fetal movements: A prospective observational study. Indian J Obstet Gynecol Res. 2021;8(3):356-362.

56. Poojari VG, Kumar SS, Vasudeva A. Obstetric and neonatal outcome among women presenting with reduced fetal movements in third trimester. Int J Reprod Contracept Obstet Gynecol. 2018;7(1):88-93.
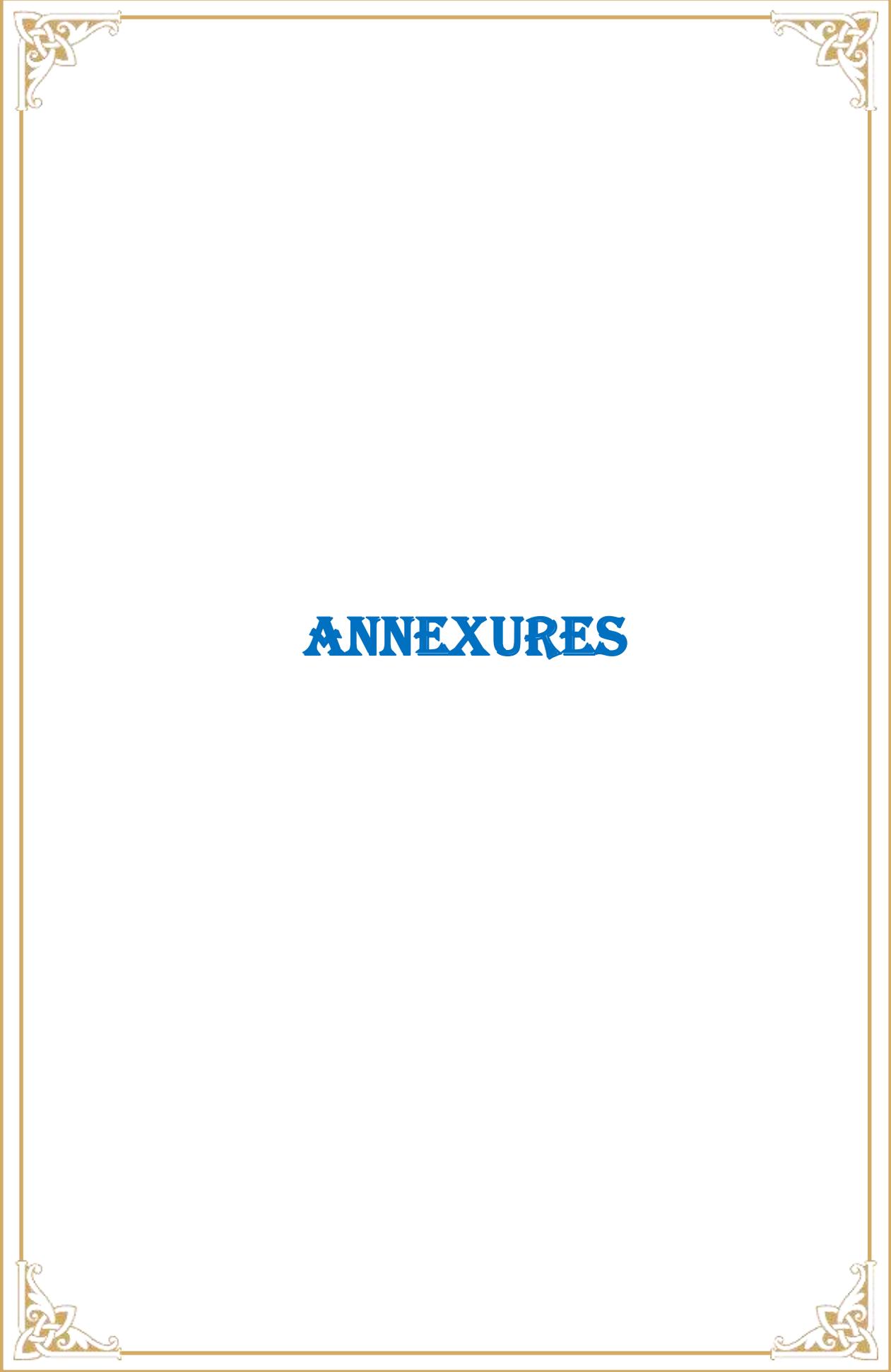
ANNEXURES

ANNEXURE I

SRI DEVARAJ URS MEDICAL COLLEGE & RESEARCH CENTRE, TAMAKA, KOLAR.

PATIENT CONSENT FORM

Case no.

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it, and any questions that I have asked have been answered to my satisfaction. I have understood that I have the right to refuse consent or withdraw it at any time during the study, and this will not affect my treatment in any way. I consent voluntarily to participate in this study

"MATERNAL PERCEPTION OF DECREASED FETAL MOVEMENTS IN TERM PREGNANCY AND ITS NEONATAL OUTCOME"

Name of Participant_____

Signature/ thumb print of Participant _____ Date _____

Statement by the researcher/person taking consent:
I have accurately read out the information sheet to the potential participant and, to the best of my ability, made sure that the participant understands that the following will be done: 5ml venous blood sample taken for routine blood investigations and obstetric scan with biophysical profile and cardiotocography.
I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Name of Researcher/person taking the consent: _____

Signature of Researcher /person taking the consent_____ Date _____

Name and Address of Principal Investigator:

Dr. Meghana.S
R.L.Jalappa Hospital Tamaka,
Kolar.

ANNEXURE II

CASE PROFORMA

NAME: IP NO:

AGE: DOA:

OCCUPATION: DOD:

ADDRESS:

EDUCATION:

HUSBAND'S OCCUPATION:

SOCIOECONOMIC STATUS:

CHIEF COMPLAINTS:

HISTORY OF PRESENTING ILLNESS:

OBSTETRIC HISTORY:

Marital life: Consanguinity:

Gravida: Para: Living: Abortion:

Dead:

Details of previous pregnancy:

Details of present pregnancy:

MENSTRUAL HISTORY:

Last menstrual period: Age of menarche:

Expected delivery date:

Period of gestation:

Period of gestation according to early scan:

Past menstrual cycles:

PAST HISTORY:

HTN/DM/TB/BLOOD   DYSCRASIAS/EPILEPSY/THYROID   DISORDER/

CARDIAC DISEASE/ ALLERGY/ ASTHMA

H/O blood transfusions:

H/O surgeries or hospitalization:

PERSONAL HISTORY:

Sleep and appetite:

Diet:

Bowel and bladder:

FAMILY HISTORY:

DRUG HISTORY:

GENERAL EXAMINATION:

General condition: Fair/moderate/Poor

Built: Nourishment:

Ht: cms: Wt: kgs

BMI:

Pallor: Icterus:

Cyanosis: Clubbing:

Lymphadenopathy: Edema:

VITALS:

Pulse rate:

Respirator

y rate:

Blood

pressure:

Temperature:

SYSTEMIC EXAMINATION:

Cardiovascular system:

Respiratory system:

Central nervous system:

Per abdomen: Uterus size:

Relaxed/ irritable/ acting

Presentation: cephalic/ breech/ other FHS:

LOCAL EXAMINATION:

Per vagina: Effacement:

Dilatation:

Station:

Membranes:

Pelvis:

PROVISIONAL DIAGNOSIS:

INVESTIGATIONS:

Blood grouping and Rh typing:

CBC: Hb: HIV:

PCV: Hbsag:

RBC: VDRL:

WB

C:

PLT:

RBS:

Urine analysis: Albumin-

              Sugar-

              Microscopy-

DFMC-

OBSTETRIC SCAN:

DELIVERY DETAILS:

Mode of delivery: Vaginal delivery/ Caesarean section

CAESAREAN-

Indication:

DETAILS OF NEONATE:

Sex: Date: Time:

                       Live/dead: Birth weight:

APGAR: 1'-   5'-

Admission to NICU:

MATERNAL COMPLICATIONS:

Hypertensi

on

Abruptio

placenta

Overt

Diabetes

Placenta

previa

Oligohydra

mnios

FETAL COMPLICATIONS:

Intrauterine death

Stillbirth

Need for resuscitation

Admission to NICU

CONDITION AT DISCHARGE:

Mothe:

Baby:

ANNEXURE III

LIST OF ABBREVIATIONS

GLOSSARY	ABBREVIATIONS
AFI	Amniotic fluid index
APGAR	Appearance, Pulse, Grimace, Activity, and Respiration
BAI	Beck anxiety inventory
CI	Confidence interval
CNS	Central nervous system
CTG	Cardiotocography
DFM	Decreased fetal movement
FHR	Fetal heart rate
hCG	Human chorionic gonadotropin
hPL	Human placental lactogen
IQR	Interquartile range
IUFD	Intrauterine fetal demise
IVF	In vitro fertilization
LSCS	Lower segment caesarean section
NICU	Neonatal intensive care unit
RFM	Reduced fetal movement
SD	Standard deviation
UA	Umbilical artery

ANNEXURE IV

KEY TO MASTER CHART

KEYS

A	AGE	18-20 YEARS	1
		21-25 YEARS	2
		26-30 YEARS	3
		31-35 YEARS	4
		>35 YEARS	5

B	GRAVIDA	PRIMIGRAVIDA	1
		GRAVIDA 2	2
		GRAVIDA 3	3
		GRAVIDA 4	4

C	GESTATIONAL AGE	37- 37+6 WEEKS	1
		38-38+6 WEEKS	2
		39- 39+6 WEEKS	3
		40- 40+6 WEEKS	4
		41- 41+6 WEEKS	5

D	MATERNAL RISK	NONE	1
	FACTORS	PREECLAMPSIA	2
		DIABETES MELLITUS	3
		RH NEGATIVE	4
		ABRUPTIO PLACENTA	5
		IUGR	6
		HYPOTHYROIDISM	7
		ANEMIA	8
		COVID POSITIVE	9

E	PATTERN OF DECREASED		
	FETAL MOVEMENTS	FREQUENCY	1
		INTENSITY	2
		BOTH	3
F	CARDIOTOCOGRAPH	NONE	1
		REASSURING CTG	2
		NONREASSURING CTG	3
		ABNORMAL	4
G	BIOPHYSICAL PROFILE	NONE	1
		NORMAL	2
		ABNORMAL	3
H	PLACENTAL LOCATION	ANTERIOR	1
		POSTERIOR	2
		OTHERS	3
I	LIQOUR VOLUME	ADEQUATE	1
		OLIGOHYDRAMNIOS	2
		POLYHYDRAMNIOS	3
J	MODE OF DELIVERY	VAGINAL	1
		LSCS	2
K	PERINATAL OUTCOME	MOTHERSIDE	1
		NICU	2
		IUFD	3

L	APGAR AT 1 MIN	NONE	1
		1-3	2
		4-6	3
		7-10	4
M	APGAR AT 5 MIN	NONE	1
		1-3	2
		4-6	3
		7-10	4
N	GENDER OF THE BABY	FEMALE	1
		MALE	2
O	BIRTH WEIGHT	<2.5 KG	1
		>= 2.5 KG	2

Master Chart

SR. NO	IP NO	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	807861	2	2	1	2	3	3	2	1	1	2	2	4	4	1	1
2	883118	2	2	1	5	3	1	1	1	1	1	3	1	1	1	1
3	824934	3	1	1	6	2	3	3	3	2	2	2	4	4	1	1
4	524922	3	2	1	3	1	2	2	2	1	2	2	4	4	2	2
5	872505	2	1	1	2	3	1	1	2	2	1	3	1	1	1	1
6	898604	3	1	1	1	1	2	2	1	1	2	2	4	4	1	2
7	910923	2	1	1	5	3	1	1	1	2	1	3	1	1	2	1
8	890584	4	3	2	1	1	2	2	1	1	2	1	4	4	2	2
9	821061	2	3	1	1	1	2	2	1	1	2	1	4	4	2	1
10	906051	2	2	1	2	1	2	2	2	1	2	2	3	4	1	2
11	931802	1	1	4	1	2	3	2	1	1	2	1	4	4	1	2
12	825851	5	4	4	3	3	1	1	1	1	1	3	1	1	1	2
13	903792	2	3	2	8	2	2	2	1	1	1	1	4	4	1	2
14	842701	2	2	5	8	1	2	3	2	2	1	1	4	4	1	1
15	816844	2	1	5	2	3	1	1	1	2	2	3	1	1	2	1
16	831117	3	1	1	2	3	1	1	3	1	1	3	1	1	2	2
17	825495	2	1	3	1	3	1	1	2	1	1	3	1	1	1	2
18	799191	2	1	4	8	2	4	3	3	2	1	2	3	3	2	1
19	798638	5	2	2	1	1	2	2	1	1	1	1	4	4	1	1
20	859132	2	3	1	2	2	3	2	1	1	2	1	4	4	1	2
21	897530	2	1	2	2	2	3	2	3	1	2	1	4	4	2	2
22	883474	2	1	1	7	3	1	1	1	1	1	3	1	1	1	2
23	801455	2	3	2	1	1	2	2	1	1	1	1	4	4	2	2
24	856800	1	1	1	9	2	3	3	3	2	2	1	4	4	1	2
25	896084	3	3	4	7	1	3	2	1	1	2	1	3	4	2	2
26	860558	3	2	1	5	3	1	1	1	1	1	3	1	1	2	2
27	735740	3	3	3	2	1	2	3	3	2	1	1	4	4	2	2
28	819467	2	2	1	1	2	3	3	2	2	2	2	3	4	1	1
29	818300	2	1	1	4	1	3	2	1	2	1	2	4	4	2	2
30	873664	5	3	2	3	3	1	1	1	2	1	3	1	1	2	1
31	870625	2	2	1	2	3	1	1	1	2	1	3	1	1	1	1
32	869587	3	3	1	4	3	1	1	2	2	1	3	1	1	2	1
33	869579	2	1	2	2	2	3	2	3	1	2	1	3	4	2	2
34	861074	3	3	1	6	3	1	1	3	1	1	3	1	1	2	1
35	874237	2	2	1	2	1	3	2	1	1	2	2	3	4	2	1
36	895698	3	1	3	1	2	3	2	2	1	2	2	4	4	1	2
37	872225	2	2	3	1	2	2	2	1	3	2	1	4	4	1	2
38	872505	2	1	1	4	3	1	1	2	2	1	3	1	1	2	1
39	863717	4	1	3	1	2	2	2	1	3	2	1	4	4	1	2
40	862803	3	4	1	3	3	1	1	3	1	2	3	1	1	2	1
41	846446	2	2	3	1	1	2	2	1	1	2	1	4	4	1	2
42	808617	4	2	3	2	3	1	1	1	2	2	3	1	1	1	2
43	800135	2	1	1	6	3	3	2	1	1	2	2	2	3	1	1
44	888024	3	3	2	9	2	2	2	2	1	2	2	3	4	1	2
45	917819	5	2	1	3	3	3	2	1	1	2	2	4	4	2	2
46	894127	1	1	2	2	3	3	2	1	1	2	1	4	4	1	2
47	903391	3	2	3	9	1	3	2	1	1	2	1	3	4	1	2
48	843918	3	1	1	6	3	2	3	3	2	1	2	3	4	2	1
49	827215	2	2	1	6	2	2	2	1	1	1	2	3	3	2	1
50	835505	1	1	1	1	3	4	2	2	3	1	2	2	3	1	2
51	842191	3	1	1	4	1	2	2	1	1	1	1	4	4	2	2
52	822610	4	2	1	7	2	2	2	1	1	2	2	3	4	2	1
53	831468	3	2	1	2	2	2	2	2	1	1	1	4	4	2	1
54	892390	3	1	1	2	3	2	3	2	2	2	1	3	4	2	2
55	886692	3	2	2	2	3	4	3	1	1	2	3	1	1	1	2
56	888024	3	3	2	2	1	2	2	2	1	2	2	3	4	1	2
57	887366	5	2	1	1	1	2	2	1	1	2	2	4	4	1	2
58	887885	2	2	1	8	3	1	1	2	1	1	3	1	1	2	1
59	888248	1	1	4	1	2	2	2	1	1	2	2	3	4	2	2
60	921557	2	2	2	4	1	2	2	2	1	1	2	4	4	2	2
61	897863	1	1	2	4	1	2	2	3	3	2	2	3	4	2	2
62	902999	2	1	2	1	3	1	1	1	1	1	3	1	1	2	1
63	929774	1	1	2	1	3	2	2	2	1	2	2	3	4	2	2
64	814459	2	3	2	2	1	2	2	3	1	2	1	4	4	2	2
65	919394	2	1	4	1	2	2	2	1	1	1	1	4	4	2	2
66	919537	3	2	3	1	2	2	2	1	1	1	1	4	4	1	2
67	903522	4	4	4	8	3	1	1	1	2	1	3	1	1	2	1
68	904652	2	1	3	1	2	2	2	2	1	1	1	4	4	2	2
69	811530	1	1	1	5	3	3	2	1	1	1	1	3	4	2	2
70	914249	3	1	2	7	3	1	1	3	1	1	3	1	1	2	2
71	920111	3	1	3	3	3	2	2	1	3	2	1	4	4	2	2

72	809987	1	1	1	2	1	3	2	1	1	2	2	3	4	2	1
73	828574	3	1	3	7	1	2	2	2	1	1	1	4	4	1	2
74	875467	2	1	5	4	3	1	1	1	1	1	3	1	1	1	2
75	888691	2	4	1	8	3	1	1	3	1	1	3	1	1	1	2
76	917379	1	1	3	1	1	2	2	2	1	1	2	3	4	1	1
77	861255	2	1	2	1	1	2	2	1	1	1	1	4	4	1	2
78	889729	3	1	1	1	3	3	3	2	2	2	2	3	4	1	1
79	889285	2	3	1	8	3	2	2	1	1	2	1	4	4	1	1
80	842936	3	3	1	7	1	2	2	1	1	2	1	4	4	2	2
81	842326	3	2	4	1	3	1	1	3	1	1	3	1	1	1	2
82	841582	3	2	1	2	1	2	2	1	1	2	1	4	4	2	2
83	846446	2	2	3	1	2	2	2	2	1	2	1	4	4	1	2
84	917304	1	1	2	1	2	2	2	3	1	2	1	4	4	1	2
85	876303	1	1	3	1	1	3	2	1	1	2	1	4	4	2	2
86	884380	2	1	2	4	2	2	2	2	1	1	1	3	4	1	2
87	858812	1	2	1	5	3	3	2	1	1	1	2	3	4	1	1
88	878761	2	1	1	5	3	1	1	3	1	1	3	1	1	2	1
89	884638	3	3	4	3	3	1	1	1	1	1	3	1	1	2	2
90	886031	2	1	1	1	1	3	2	2	1	2	1	3	4	2	2
91	886035	2	1	1	1	2	3	2	1	1	2	1	3	4	2	2
92	865390	3	1	3	1	3	3	2	3	1	2	1	4	4	2	2
93	882502	2	2	1	5	3	3	2	1	1	2	1	3	4	2	2
94	884467	2	3	2	5	3	1	1	1	3	1	3	1	1	2	2
95	859795	2	2	1	5	3	1	1	1	1	1	3	1	1	1	2
96	934427	2	1	2	1	1	1	1	2	1	1	1	4	4	1	2
97	929281	2	2	4	1	3	2	2	1	3	2	1	4	4	1	2
98	883474	2	1	1	7	3	1	1	1	1	1	3	1	1	1	2
99	930886	2	1	1	4	1	2	3	2	2	1	2	3	4	1	1
100	922031	2	2	1	8	3	1	1	1	2	1	3	1	1	1	1