"TO STUDY THE ROLE OF UMBILICAL ARTERY PULSATILITY INDEX (PI) AS A PREDICTOR OF PERINATAL OUTCOME IN GROWTH RESTRICTED FETUS"

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LIST OF ABBREVIATIONS USED

AC	:	Abdominal Circumference
AEDF	:	Absent End Diastolic Flow
AGA	:	Appropriate for Gestational Age
AFI	:	Amniotic Fluid Index
BMI	:	Body mass index
BPP	:	Biophysical Profile
CAPO	:	Composite adverse perinatal outcome
CI	:	Confidence Interval
CPR	:	Cerebroplacental Ratio
CPAP	:	Continuous Positive Airway Pressure
CPD	:	Cephalopelvic Disproportion
DV	:	Ductus venosus
EDF	:	End Diastolic Flow
EFGR	:	Early onset fetal growth restriction
EFW	:	Estimated Fetal Weight
FSB	:	Fresh Still Birth
GA	:	Gestational age
GDM	:	Gestational Diabetis Mellitus
GM	:	Gram
HTN	:	Hypertension
IVH	:	Intraventricular haemorrhage
IUGR	:	Intrauterine growth restriction
KG	:	Kilogram

KMC	:	Kangaroo Mother Care
LBW	:	Low Birth weight
LSCS	:	Lower Segment Caesarean Section
LR	:	Likelihood Ratio
MCA	:	Middle Cerebral artery
NEC	:	Necrotizing Enterocolitis
NPV	:	Negative Predictive Value
PE	:	Precclampsia
PI	:	Pulsatility Index
PIH	:	Pregnancy Induced Hypertension
PPV	:	Positive Predictive Value
REDF	:	Reversal End diastolic Flow
RDS	:	Respiratory Distress Syndrome
RHD	:	Rheumatic Heart Disease
RI	:	Resistive Index
RR	:	Risk Ratio
S/D	:	Systolic/ Diastolic ratio
SFH	:	Symphysis fundal height
SGA	:	Small for Gestational Age
TORCH	:	Toxoplasma, Rubella, Cytomegalovirus and herpes simplex
UA	:	Umbilical artery
UtA	:	Uterine artery

ABSTRACT

Background: Doppler ultrasound of fetal vessels play a crucial role for diagnosing and managing fetal growth restriction. It helps to identify fetal compromise early and predict adverse perinatal outcomes in childbirth.

Aim: To study the role of pulsatility index (PI) of umbilical artery doppler in prediction of adverse perinatal outcomes in fetuses diagnosed as FGR.

Material and methods: This prospective observational study enrolled 180 singleton pregnancies that met the inclusion criteria and provided informed written consent. umbilical artery doppler evaluation was done and perinatal outcome was recorded. Adverse perinatal outcome included low Apgar scores at one and five minutes, prolonged NICU admission, respiratory distress, neonatal sepsis, perinatal death. statistical association of umbilical artery PI with adverse perinatal outcome in entire study population as well as in EFGR and LFGR were studied separately.

Results: Adverse perinatal outcomes are often correlated with abnormal pulsatility index (PI) values in fetal umbilical artery. The sensitivity of umbilical artery pulsatility index (UA PI) for predicting adverse perinatal outcomes in FGR cases of fetal growth restriction (FGR) was 43.21% and the specificity of UA PI was higher at 85.86% . Umbilical artery PI was most sensitive(62.5%) in EFGR but it was most specific (88.3%) in LFGR cases for predicting adverse perinatal outcome . Overall, the diagnostic accuracy of UA PI for predicting adverse perinatal outcomes in FGR cases was 66.67%. Furthermore Abnormal umbilical artery PI was found to be associated with low birth weight, increased rate of caesarean section and also associated with increased perinatal morbidity and mortality.

Conclusion: Umbilical artery PI was most sensitive (62.5%) in Early onset FGR but it was most specific (88.3%) in Late onset FGR cases for predicting adverse perinatal outcome.

Keywords: Fetal growth restriction, Umbilical artery pulsatility index, Adverse perinatal outcome.

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INTRODUCTION

Foetal growth restriction (FGR) is defined as failure of a foetus to reach its genetic potential in utero, putting it at risk of perinatal mortality & morbidity. The constitution of certain foetuses is such that they are relatively small, and these foetuses do not have an elevated risk of perinatal morbidity and death.[1, 2] A higher risk of morbidity and death is associated with growth-restricted foetuses, which may or may not be small for the date [2–4]. The identification of growth-restricted foetuses that are at a high risk of problems is of utmost importance for the purposes of clinical care. For the purpose of diagnosis (differentiation between healthy small for date and growth-restricted foetuses) and in-utero monitoring of the evolution of the condition, Doppler ultrasonography is utilised in foetuses that have intrauterine growth restriction (IUGR) [5]. Among the arteries that are often investigated and recommended the umbilical artery (UA) comes in first, followed by the middle cerebral artery (MCA) [6] and ductus venosus when other doppler parameter is normal. The systolic/diastolic (S/D) ratio, the resistance index (RI), and the pulsatility index (PI) are the three Doppler indices that are utilised the most frequently in order to analyse arterial blood flow resistance and detect intrauterine growth restriction (IUGR) [2, 5, 7, 8].

The rate of perinatal death in neonates with growth restriction are anywhere from six to ten times higher than those of newborns with normal development. [2] Growth-restricted newborns have been shown to have a considerably increased risk of developing respiratory distress syndrome (RDS), necrotizing enterocolitis (NEC), intraventricular haemorrhage (IVH), coagulation problems, and multi-organ failure, according to a number of studies. [1,8,9] It has been shown that high perinatal morbidity

& mortality is more commonly associated with end diastolic flow velocities in the umbilical arteries that are either missing or reversed.[2, 5, 9–15].

According to the gestational age at which it first manifests itself, FGR can be divided into two categories: early-onset, which occurs before 32 weeks of gestation, and late-onset, which occurs beyond 32 weeks .[3, 4] When compared to LFGR, cases of EFGR have more severe placental alterations, a higher correlation with PIH (70 percent as opposed to 10 percent in LFGR), and more severe Doppler changes .[11]Of the cases of EFGR that we investigated, 61% were related with PIH. There is a correlation between pregnancy-induced hypertension and poor placental trophoblastic invasion, which leads to increased resistance in placental vessels, which can be observed as spectral alterations in the umbilical arteries [12]. A decrease in diastolic flow in UA is one of the early alterations that can be noticed in FGR. This decrease is caused by an increase in resistance that takes place in the tiny arteries and arterioles of the placental tertiary villi. The phenomenon that is referred to as the "brain-sparing effect" [13], which occurs when there is an increase in uteroplacental insufficiency, allows for a redistribution of blood flow towards the brain of the foetus. For the purpose of identifying impaired foetal circulation and managing foetal growth restriction (FGR), spectral Doppler evaluation of foetal vasculature is utilised. It is possible to make accurate predictions about the outcomes of the perinatal period by using the umbilical artery Doppler [14, 15].

In order to prevent the high rates of perinatal morbidity and death that are associated with growth-restricted foetuses, it is necessary to monitor and evaluate the condition using a variety of standards. When it comes to growth-restricted foetuses, it is of utmost importance to ensure that appropriate prenatal identification and care are carried out in order to prevent certain perinatal issues that might result in problematic

outcomes. It has been claimed that umbilical artery doppler (UA Doppler) can considerably reduce perinatal mortality and iatrogenic early treatments. This is accomplished by distinguishing pathologic growth restriction from naturally small foetuses. UA Doppler, when used in conjunction with normal antepartum testing, was shown to be related with a reduction in perinatal mortality of up to 38 percent, according to a meta-analysis of randomised controlled trials [16].

AIMS AND OBJECTIVES

PRIMARY OBJECTIVE: To study the efficacy of pulsatility index of umbilical artery doppler in prediction of adverse perinatal outcomes in fetuses diagnosed as FGR.

NEED FOR THE STUDY: Fetal growth restriction (FGR) is a commonly encountered complication in pregnancy, which has been associated with increased perinatal morbidity and mortality. Doppler ultrasound is crucial for early identification of fetal distress and guides decisions regarding delivery timing and method. Assessing the pulsatility index of the umbilical artery through spectral Doppler is essential in diagnosing and monitoring these conditions, as abnormalities detected can forecast adverse perinatal outcomes for the baby.

REVIEW OF LITERATURE

The rate of foetal growth that is below normal in light of the growth potential of a particular newborn as determined by the race and gender of the foetus is referred to as intrauterine growth restriction (IUGR). This is the definition that has evolved throughout time. In addition, it has been defined as a divergence from or a reduction in a predicted foetal growth pattern. In most cases, it is the result of an innately lowered growth capacity or as a consequence of many detrimental impacts on the foetus. [17] The term "normal" refers to a newborn who does not exhibit any signs of malnutrition or growth restriction and whose birth weight is between the range of the 10th to 90th percentile according to the gestational age, gender, and race of the mother. In the medical literature, the phrases "IUGR" and "small for gestational age (SGA)" have been used interchangeably; nonetheless, there are some subtle distinctions between the two terminologies. This term has been used for neonates whose birth weight is less than the 10th percentile for that particular gestational age or two standard deviations below the population norms on the growth charts. The definition of SGA is based on the cross-sectional evaluation, which can be either prenatal or postnatal. Therefore, the definition only takes into consideration the birth weight, without taking into account the in-utero growth or the physical characteristics of the newborn at birth.[17]

Neonates who are born with clinical symptoms of malnutrition and in-utero growth restriction are considered to have an IUGR, which is a clinical definition. This definition applies to neonates regardless of their birth weight percentile.

In the evolving landscape , newborn who are appropriate for gestational age (AGA) may be classified as having in-utero growth retardation (IUGR) if they exhibit

characteristics of malnutrition and in-utero growth retardation at the time of delivery. Because of this, it is essential to keep in mind that neonates with a birth weight that is lower than the 10th percentile will be classified as SGA, but they will not be classified as an IUGR if there are no signs of malnutrition. On the other hand, a neonate with a birth weight that is higher than the 10th percentile will be classified as an IUGR, even though they are classified as an AGA, if the infants have signs of malnutrition at birth. The definition of low birth weight (LBW) is based on the birth weight (less than 2,500 g), regardless of gestational age, sex, race, or clinical characteristics. This means that LBW is a distinct entity that should not be confused with intrauterine growth restriction (IUGR) or small for gestational age (SGA). [18]

The definitions of IUGR and SGA are the same for infants who are born low birth weight as well. [17]

THE EPIDEMIOLOGY

When compared to industrialised nations, the incidence of IUGR is six times greater in undeveloped and developing countries. Furthermore, this incidence might be much higher in lower- and middle-income countries due to the fact that many children are born in the home without any birth records. The incidence of intrauterine growth restriction (IUGR) varies, depending on the country, population, and race, and it rises as the gestational age decreases. [19] There are a significant proportion of newborns with IUGR seen in all of the afflicted infants. In India, the prevalence of LBW has been reported as 26% [13]. while the proportion of IUGR has been found to be 54% [14,15]. The continents of Africa and Latin America come next in the order of their appearance. Countries on the Asian continent that have the highest incidences of low birth weight (LBW) and intrauterine growth restriction (IUGR–LBW) are as follows: Bangladesh, India, Pakistan, Sri Lanka, Cambodia, Vietnam and the

Philippines, Indonesia and Malaysia, Thailand, and the People's Republic of China (PRC). These countries are listed in decreasing order. [19,20]

DEFINITION

According to the population growth charts, a weight that falls below the 10th percentile for gestational age is considered to be smaller than the small gestational age (SGA). It is possible to further categorized it as follows and [21]

Weighing between the third and tenth percentiles at birth is considered moderate. A birth weight that is lower than the third percentile is considered severe.

Consensus-based definitions for early and late fetal growth restriction (FGR) in absence of congenital anomalies:[54]

Early FGR: GA < 32 weeks, in absence of congenital anomalies	Late FGR:GA ≥ 32 weeks, in absence of congenital anomalies
AC/EFW < 3rd centile or UA-AEDF Or, 1. AC/EFW < 10th centile *combined with* 2. Ut A-PI > 95th centile *and/or* 3. UA-PI > 95th centile	AC/EFW < 3rd centile *Or at least two out of three of the following* 1. AC/EFW < 10th centile 2. AC/EFW crossing centiles >2 quartiles on growth centiles 3. CPR < 5th centile *or* UA-PI > 95th centile

IUGR'S SYSTEM OF CLASSIFICATION

Based on when it initially presents, fetal growth restriction (FGR) can be categorized into two groups: early-onset (formerly known as symmetrical FGR) ,occurring before 32 weeks of gestation, and late-onset (formerly known as asymmetrical FGR),occurring after 32 weeks.[3,4] Asymmetrical IUGR, also known as

malnourished newborns , symmetrical IUGR, also known as hypoplastic small for date, and mixed IUGR are the three most common kinds of intrauterine growth restriction (IUGR). A number of clinical and anthropometric characteristics have led to this conclusion. Mixed IUGR is the name given to a third kind, which is typically seen in nations that are still in the process of developing. Babies that have this kind have a smaller number of cells and smaller cell sizes than other infants. At delivery, these neonates have clinical characteristics that are consistent with both symmetrical and asymmetrical IUGR. Early IUGR can be altered further by placental reasons in late pregnancy, which can lead to this form of intrauterine growth restriction (IUGR). [22]

RISK FACTORS FOR FGR

- Extremes of reproductive age (younger than 16yrs and older than 35 yrs).
- Poor maternal weight gain.
- Poor pre-pregnancy weight.
- Severe malnutrition.
- low socio-economic status
- Maternal medical conditions : Hypertension, Renal disease, Diabetes (with microvascular disease), Cyanotic heart disease, Antiphospholipid syndrome, collagen vascular disease, Hemoglobinopathies
- Chromosomal anomalies
- Structural anomalies
- Primary placental disease
- Infections
- Exposure to teratogens.

ETIOLOGICAL FACTORS IN FGR

- Placental causes 80%
- Maternal disease 5%
- Fetal chromosomal anomalies 5%
- Fetal infections 5%
- Multifactorial fetal abnormalities 2-4%

ETIOPATHOGENESIS OF FGR

PLACENTAL CAUSES (Most common cause)

1. Incomplete trophoblastic invasion of the spiral arteries in the placental bed.
2. Accelerated atherosclerosis of spiral arteries.
3. Increased no. of synctial knots, obliteration of arteries in tertiary stem villi, stromal fibrosis.
4. Placental infarction and thrombosis due to factor V leiden mutation and antiphospholipid syndrome
5. Chronic villitis, haemorrhagic endovasculitis , placental mosaicism.

FETAL CAUSES

- Chromosomal abnormalities especially trisomy 18.
- Viral infections like congenital rubella, cytomegalovirus, varicella,
- HIV, Herpes simplex virus.
- Osteogenesis imperfecta.
- Multiple pregnancy, heart diseases

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MATERNAL CAUSES

- Chronic hypertension
- Chronic renal disease
- Diabetes
- Preeclampsia
- Grade 3,4 heart disease
- Smoking, alcohol, tobacco chewing.
- SLE
- Fever, sickle cell anaemia

UTERINE CAUSES

- Bicornuate uterus, didelphis uterus.
- Fibroid uterus.

There are a number of causes that can cause intrauterine growth restriction (IUGR), including maternal, placental, foetal, or genetic factors. Additionally, IUGR can be caused by a combination of any of these factors There are a number of maternal variables that influence the growth of the foetus and are responsible for the development of intrauterine growth restriction (IUGR). [18] These factors include the mother's age, the inter-pregnancy interval (less than six months or more than one hundred twenty months), maternal health, behavioural patterns, and maternal infection. Irregular uterine growth restriction (IUGR) can also be caused by any mismatch between the supply of nutrients by the placenta and the demand of the foetus.

Certain instances of intrauterine growth restriction (IUGR) can be attributed to foetal deformities, inborn errors of metabolism, and chromosomal abnormalities. [23]

The function of numerous maternal, foetal, and placental gene polymorphisms is becoming increasingly relevant as a result of recent advancements in molecular biology and genetics. These polymorphisms have recently been identified as a cause of intrauterine growth restriction (IUGR). [18, 24-27]

EARLY-ONSET FGR VS. LATE-ONSET FGR :

The pathways and symptoms vary between early-onset and late-onset presentations of placental insufficiency syndrome and FGR. Early pregnancy placental insufficiency syndrome typically arises from abnormal placentation during the first trimester or severe placental damage, as elaborated below. Insufficient placental development compromises both the endocrine and transport functions of the placenta. During early pregnancy, the fetus requires higher metabolic support compared to respiratory needs. When placental function is inadequate, the fetus initiates compensatory mechanisms by redistributing blood flow towards vital organs. This adaptation can be assessed using Doppler ultrasound and may manifest as asymmetrical growth restriction. The resistance in the supplying vessels to essential organs such as the brain, heart, and adrenals decreases, facilitating relatively unimpeded exchange of gases and nutrients. Conversely, vascular resistance increases in the blood supply to organs like the kidneys, lungs, intestines, skin, and bones. This hemodynamic redistribution is notably well-documented in the middle cerebral artery. When there's heightened vascular resistance in the umbilical artery, leading to reduced blood flow, a phenomenon known as "brain sparing" occurs, characterized by decreased vascular resistance in the middle cerebral artery .[55-58]

In early placental insufficiency syndrome, fetuses are often readily diagnosed due to their extreme phenotype. However, therapeutic options are limited because the balance between maturation and nutrition/oxygenation is skewed towards the need for maturation. High rates of perinatal morbidity and mortality are observed due to the combination of fetal growth restriction (FGR) and extreme prematurity. Moreover, early-onset fetal growth restriction (FGR) is linked with maternal pre-eclampsia in approximately 50% of cases. Furthermore, in instances of early-onset pre-eclampsia, FGR is diagnosed in over 90% of cases. [59-61]

Late-onset fetal growth restriction (occurring after 32 weeks of gestation) is a condition more closely associated with normal placental aging. The clinical challenge lies in identifying fetuses at risk of severe adverse outcomes. Diagnosis becomes more challenging as ultrasound and fundal symphysis measurements for size assessment become more difficult. [62]

As gestational age progresses, there's a relative increase in the fetus's respiratory needs. Inadequate placental function at this stage can result in hypoxia, even if the nutritional supply had been adequate until that point. Hence, the most recognized indicator of placental insufficiency, fetal size, might not deviate from standard cut offs. Since the fetus may not fall below the traditional thresholds for small size, diagnosing placental insufficiency in late gestation becomes more challenging. However, once identified, expedited delivery as a treatment option typically carries minimal risks, given that the balance between maturation and nutrition/oxygenation tends to favor the latter. [54]

Inducing delivery in cases of late-onset FGR often leans towards improving nutrition and oxygenation, thus rebalancing the perinatal morbidity and mortality outcomes. However, due to the complexities of diagnosis, the risk of false positives is

lower compared to early-onset FGR, primarily because newborns are less premature at birth. [63]

Identifying the Signs of Growth Restriction Before Birth:

The early discovery of intrauterine growth restriction (IUGR) is the objective of prenatal monitoring. This allows for the optimisation of antenatal care, which ultimately results in a better prognosis for the newborn. The general outcome of these IUGR has not altered significantly over the course of time, which is unfortunate in spite of the steps that have been taken. Despite the fact that close monitoring will result in adjustments to the time of birth or management, there is still uncertainty over the sort of prenatal monitoring that should be performed and when it should be performed. [28]

The investigation required for high-risk mothers who are susceptible of having IUGR foetus includes risk factor assessment in maternal and familial history, maternal anthropometry with maternal pre-pregnancy weight and height, maternal nutritional status, exact gestational dating, fundal height with foetal palpation, cardiotocography (CTG), ultrasound with Doppler, and accurate foetal weight measurement estimated using biometric measures abdominal circumference [AC], head circumference [HC], biparietal diameter, and femur length [FL]). Within the context of foetuses that have been diagnosed with asymmetric foetal growth restriction (FGR), the HC/AC ratio has been utilised. [29], When compared with simultaneous head circumference and femur length, the size of the liver seen in these forms of IUGR is excessively little. This is because the head circumference and femur length are not altered at the beginning of the process of IUGR. The HC/AC ratio falls in a linear fashion over the course of pregnancy, with a normal foetus and a ratio that is larger than two standard deviations (SD) above the mean. The gestational age (GA) has been deemed abnormal since it

indicates a considerable reduction in AC. An aberrant HC/AC ratio has been demonstrated to be more specific and to have a negative predictive value in the detection of asymmetric IUGR when compared to symmetrical IUGR, according to a few studies. [30 , 31] These intrauterine growth restriction (IUGR) foetuses have a body mass index (BMI) that is lower than its normal counterpart at birth, and they exhibit a considerable increase in BMI after delivery. [32]

At the beginning of the first trimester, the crown rump length of the foetus should be measured, and the date of the last menstrual cycle should also be taken into consideration when determining the correct gestational age. In order to diagnose intrauterine growth restriction (IUGR), a foetal weight growth chart that is tailored to a particular population based on race and ethnicity can be utilised. Serial tests are required in order to correctly establish IUGR on ultrasonography. These examinations must be performed at least three weeks apart in order to reduce the number of false-positive rates that occur while diagnosing FGR. When it comes to detecting IUGR, the abdominal circumference has a specificity and a negative predictive value that are quite near to 90 percent. Although abdominal palpation and measurement of symphysis–fundal height (SFH) are both traditional screening procedures for foetal development, the detection rates for intrauterine growth restriction (IUGR) are very low.

Following the identification of maternal risk factors and intrauterine growth restriction (IUGR), the mother is examined using foetal karyotype to look for chromosomal abnormalities, maternal infections such as TORCH (Toxoplasma, rubella, cytomegalovirus, and herpes), syphilis, and malaria, particularly in regions with a high prevalence of the epidemic. A foetal medicine specialist should do a complete foetal anatomical survey, a TIFFA scan (targeted imaging for foetal

anomaly), and a uterine artery Doppler examination on the mother in the event that severe SGA is discovered during the 18–20 week scan. [33]

The foetal acid–base state is reflected in the biophysical profile (BPP), which has been utilised to evaluate the risk of intrauterine growth restriction (IUGR) and to monitor the IUGR foetus. BPP alterations in IUGR foetuses follow a preset sequence that includes reactivity, which fades first, followed by foetal breathing, foetal movement, and tone, and the final change is a reduction in amniotic fluid. This pattern takes place in the order that the reactivity departs.30 % There was inadequate evidence from a variety of randomised controlled trials to support the use of BPP as a measure of foetal well-being in high-risk pregnancies, according to the findings of the Cochrane meta-analysis. [34]

VELOCITIES OF THE DOPPLER

As a clinical tool, Doppler velocities are particularly useful in the event of placental insufficiency, which is the cause of intrauterine growth restriction (IUGR). The uterine artery Doppler, the umbilical artery Doppler, the middle cerebral artery Doppler, the cerebro-placental ratio (CPR), the ductus venosus Doppler, and the aortic isthmus Doppler are the numerous Doppler velocities that are being utilised for the purpose of evaluating the well-being of the foetus and performing the detection of intrauterine growth restriction (IUGR).[35] Continuous evaluation of the maternal, placental, and foetal circulations can be accomplished by the utilisation of Doppler. Additionally, the umbilical and middle cerebral arteries supply information regarding the circulation of the foetus, whereas the uterine arteries are responsible for providing information regarding the circulation of the mother.

UMBILICAL ARTERY DOPPLER

When it comes to predicting unfavourable outcomes in SGA foetuses that are detected during the third trimester, Doppler has been shown to have inadequate sensitivity and specificity.[36] These conditions are responsible for a few instances of early-onset intrauterine growth restriction (IUGR) and for the majority of cases of late-onset pregnancy-related growth restriction (FGR). [37] artery of the umbilical cord When it comes to the management of FGR, Doppler allows for both diagnostic and prognostic information to be obtained. A number of Doppler anomalies, including increased resistance in blood arteries or absence of end diastolic flow (AEDF), as well as reversal end diastolic flow (REDF), are observed in patients with IUGR. A good link has been shown between the increased umbilical artery Doppler pulsatility index (PI) and the early detection of foetal growth restriction (FGR), either on its own or in conjunction with the cerebro-placental ratio (CPR) ratio. AREDF is typically connected with the death of the foetus or the damage of a number of the foetal organs. Umbilical artery Doppler was shown to lower the incidence of perinatal fatalities (risk ratio [RR] 0.71, 95% confidence interval [CI] 0.52–0.98), lead to fewer inductions of labour (RR 0.89, 95% CI 0.80–0.99), and lead to fewer caesarean sections (RR 0.90, 95% CI 0.84–0.97), according to a meta-analysis conducted by the Cochrane Society. The study included 14 trials and 7,918 women participated. In addition, the investigators noted that there was no change in the number of surgical vaginal deliveries (relative risk = 0.95, 95% confidence interval = 0.80–1.14) or in the number of Apgar scores that were less than seven at five minutes (relative risk = 0.92, 95% confidence interval = 0.69–1.24). [38] The compensatory vasodilation of brain blood arteries that occurs in response to hypoxia (cephalization) is described by the middle cerebral artery (MCA), which expresses the significance of this phenomenon. It is a

late manifestation, and the sensitivity and specificity of the condition improve when cerebroplacental ratio (CPR) is performed simultaneously. [39] MCA Doppler was shown to have poor predictive accuracy for unfavourable prenatal outcome (LR+ 2.79, 95% CI 1.10–1.67; LR – 0.56, 95% CI 0.43–0.72) and perinatal death (LR+ 1.36, 95% CI 1.10–1.67; LR – 0.51, 95% CI 0.29–0.89), according to the findings of Morris et al., who conducted a comprehensive assessment of 31 observational studies. [40] To increase the sensitivity of the umbilical artery and the middle cerebral artery (MCA) for the diagnosis of FGR, the combination of the CPR, which is a diagnostic index, is performed. This is due to the fact that higher placental impedance of the uterine artery is also associated with lower cerebral resistance (MCA), which results in a reduction in cerebroplacental ratio (CPR), under situations where other parameters are still within normal ranges. It has been demonstrated that the ductus venosus (DV) Doppler is the most reliable single Doppler parameter for predicting the short-term risk of foetal death in early-onset foetal growth restriction (FGR). Furthermore, it has been demonstrated that it only becomes abnormal in advanced stages of foetal compromise [41,42], and it has also been demonstrated to have a good correlation with cord acidemia [43] and perinatal mortality. [44] There are no systematic evaluations that have been conducted to examine the efficacy of venous Doppler as a monitoring technique in foetuses that are considered to be high risk or that are classified as SGA. In a systematic review of 18 observational studies, Yagel et al. found that [47] DV Doppler had a moderate predictive accuracy for the prediction of perinatal mortality in high-risk foetuses with placental insufficiency. The pooled positive likelihood ratio for DV Doppler was 4.21 (95% confidence interval: 1.98–8.96), and the pooled negative likelihood ratio was 0.43 (95% confidence interval: 0.30–0.61). There is a correlation between aortic isthmus (AoI) Doppler and greater foetal mortality as well as neurological morbidity in situations of early-onset foetal

growth restriction (FGR). AoI Doppler demonstrates that the impedance of the brain and the systemic circulatory systems are in equilibrium. Furthermore, reversal of AoI flow is observed in the advanced degeneration of the foetal growth restriction (FGR) foetus. With simultaneous measurement of other Doppler and cerebroplacental ratio (CPR), the positive predictive value of umbilical artery Dopplers, which are the most often used Dopplers for the identification of intrauterine growth restriction (IUGR), is enhanced. [47, 48]

Using foetal biometry (estimated foetal weight [EFW], abdominal circumference [AC]), Doppler cardiovascular changes, amniotic fluid volume, and clinical data, Mari et al. have developed a method for the staging of intrauterine growth-restricted foetuses. This method was developed for the objective of reducing the risk of complications during pregnancy. Regardless of the gestational age of the pregnancy, this staging may be used to every pregnancy. Among the components of the categorization are the following: [49]

- Stage 0: Fetuses with an EFW or an AC, 10^{th} percentile. Doppler of the UA and MCA is normal.
- Stage I: Fetuses whose EFW or AC is, 10^{th} percentile plus abnormal Doppler flow of the UA or MCA.
- Stage II: Fetuses whose EFW or AC is,10^{th} percentile plus absent or reversed Doppler flow of the UA
- Stage III: Fetuses whose EFW or AC is,10^{th} percentile plus absent or reversed Doppler flow of the DV

Umbilical arterial (UA) Doppler assessment is used to survey fetal well-being in the third trimester of pregnancy. Abnormal umbilical artery Doppler is a marker of placental insufficiency and consequent intrauterine growth restriction (IUGR) or suspected pre-eclampsia.

Umbilical artery Doppler assessment has been shown to reduce perinatal mortality and morbidity in high-risk obstetric situations [5].

As a general rule, a degree of caution should be exercised with the routine use of Doppler in pregnancy, due to the concerns related to heating/thermal effects from the high intensities of Doppler ultrasound.

Doppler ultrasound evaluation of the fetoplacental circulation is not indicated in low-risk pregnancies. [7]

INDICATIONS

Umbilical Doppler assessment is indicated in scenarios where there is a risk of fetal growth restriction or poor perinatal outcome. It is also used to stage twin-twin transfusion. [7]

- Maternal conditions
- Diabetes mellitus
- Chronic kidney disease
- Hypertension
- Prothrombotic states
- Pregnancy-related conditions
- Suspected IUGR
- Previous pregnancy with IUGR or fetal death in utero

- Decreased fetal movement
- Oligohydramnios
- Polyhydramnios
- Multifetal pregnancy

RADIOGRAPHIC FEATURES

The spectral Doppler indices measured at the fetal end, the free loop, and the placental end of the umbilical cord are different with the impedance highest at the fetal end. The changes in the indices are likely to be seen at the fetal end first. Ideally, the measurements should be made in the free cord, however, for consistency of recording in cases being followed up, a fixed site would be more appropriate, i.e. fetal end, placental end, or intra-abdominal portion. Due to difficulty with measuring the cord at the fetal end in many growth-restricted fetuses, measurement in a free loop is acceptable [7,8].

WAVEFORM

The umbilical arterial waveform usually has a "sawtooth" pattern with flow always in the forward direction, that is towards the placenta. An abnormal waveform shows absent or reversed diastolic flow. Before the 15th week, the absence of diastolic flow may be a normal finding [6].

The 95% confidence interval limit slowly decreases for both the resistive index (RI) and pulsatility index (PI) through the course of gestation due to progressive maturation of the placenta and increase in the number of tertiary stem villi.

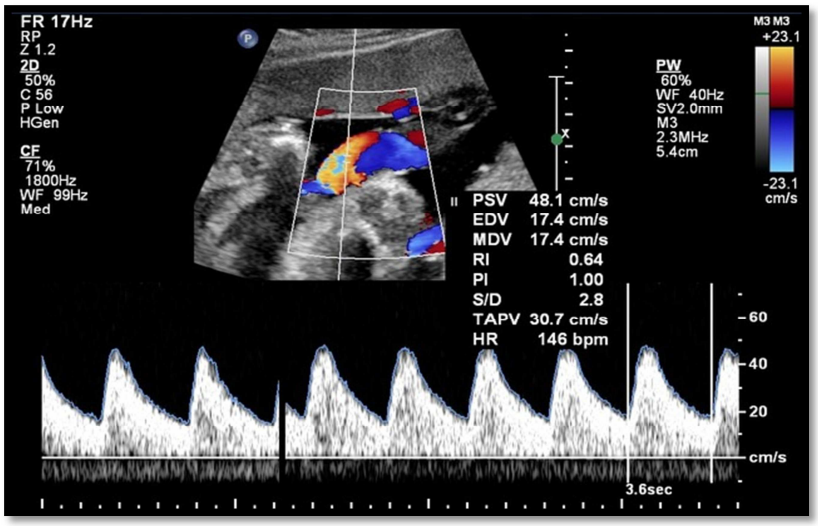


FIGURE: NORMAL UA DOPPLER TRACE

The commonly used parameters are:

1. umbilical arterial S/D ratio (SDR): systolic velocity / diastolic velocity
2. pulsatility index (PI) (Gosling index): (PSV - EDV) / TAV
3. resistive index (RI) (Pourcelot index): (PSV - EDV) / PSV
4. PSV: peak systolic velocity
5. EDV: end-diastolic velocity
6. TAV: time-averaged velocity

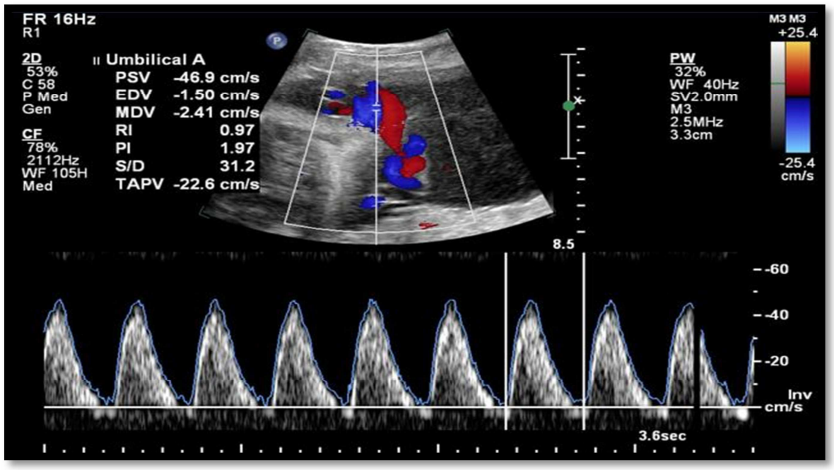


FIGURE:- DOPPLER SHOWING REVERSAL OF EDF

The Doppler indices have been found to decline gradually with gestational age (i.e. there is more diastolic flow as the fetus matures):

1. S/D ratio mean value decreases with fetal age 8
2. at 20 weeks, the 50th percentile for the S/D ratio is 4
3. at 30 weeks, the 50th percentile is 2.83
4. at 40 weeks, the 50th percentile is 2.18
5. RI mean value decreases from 0.756 to 0.609
6. PI mean value decreases from 1.270 to 0.967

Classification

In growth-restricted fetuses and fetuses developing intrauterine distress, the umbilical artery blood velocity waveform usually changes in a progressive manner as below

1. Reduction in end-diastolic flow: increasing RI values, PI values, and S/D ratio
2. Absent end-diastolic flow (AEDF): RI = 1
3. Reversal of end-diastolic flow (REDF)

SCORING SYSTEMS THAT UTILIZE UA DOPPLER

1. Delphi consensus criteria
2. Gratacos staging.

Stage	Pathophysiological Correlation	Criteria
I	Very small EFW or moderate placental insufficiency	EFW < p3 EFW < p10 + any of these criteria: • CPR < p5* • PI MCA < p5* • PI UtA > p95
II	Severe placental insufficiency	EFW < p10 + absent diastolic flow in UA**
III	Low suspicion of fetal acidosis	EFW < p10 + any of these criteria: • Reverse diastolic flow in UA** • PI-DV > p95 or absent diastolic flow in the DV***
IV	High suspicion of fetal acidosis	EFW < p10 + any of these criteria: • Reverse diastolic flow in the DV*** • Pathological CTG

Stage I Fetal Growth Restriction (Severe Smallness or Mild Placental Insufficiency). Either UtA, UA or MCA Doppler, or the CPR are abnormal. In the absence of other abnormalities, evidence suggests a low risk of fetal deterioration before term. Labor induction beyond 37 weeks is acceptable, but the risk of intrapartum fetal distress is increased [50]. Cervical induction with Foley catheter is also recommended. Weekly monitoring seems reasonable.

Stage II Fetal Growth Restriction (Severe Placental Insufficiency). This stage is defined by UA absent-end diastolic velocity (AEDV) or reverse AoI. Although evidence for UA AEDV is stronger than that for AoI, observational evidence suggests an association between the latter to abnormal neurodevelopment, so that both criteria become a single category. Delivery should be recommended after 34 weeks. The risk of emergent cesarean section at labor induction exceeds 50%, and, therefore, elective cesarean section is a reasonable option. Monitoring twice a week is recommended.

Stage III Fetal Growth Restriction (Advanced Fetal Deterioration, Low-Suspicion Signs of Fetal Acidosis). The stage is defined by reverse absent-end diastolic velocity (REDV) or DV PI >95th centile. There is an association with a higher risk of stillbirth and poorer neurological outcome. However, since signs suggesting a very high risk of stillbirth within days are not present yet, it seems reasonable to delay elective delivery to reduce as possible the effects of severe prematurity. We suggest delivery should be recommended by cesarean section after 30 weeks. Monitoring every 24–48 h is recommended.

Stage IV Fetal Growth Restriction (High Suspicion of Fetal Acidosis and High Risk of Fetal Death). There are spontaneous FHR decelerations, reduced STV (<3 ms) in the cCTG, or reverse atrial flow in the DV Doppler. Spontaneous FHR deceleration is an ominous sign, normally preceded by the other two signs, and thus it is rarely observed, but if persistent it may justify emergency cesarean section. cCTG and DV are associated with very high risks of stillbirth within the next 3–7 days and disability. Deliver after 26 weeks by cesarean section at a tertiary care center under steroid treatment for lung maturation. Intact survival exceeds 50% only after 26–28 weeks, and before this threshold parents should be counseled by multidisciplinary teams. Monitoring every 12–24 h until delivery is recommended.

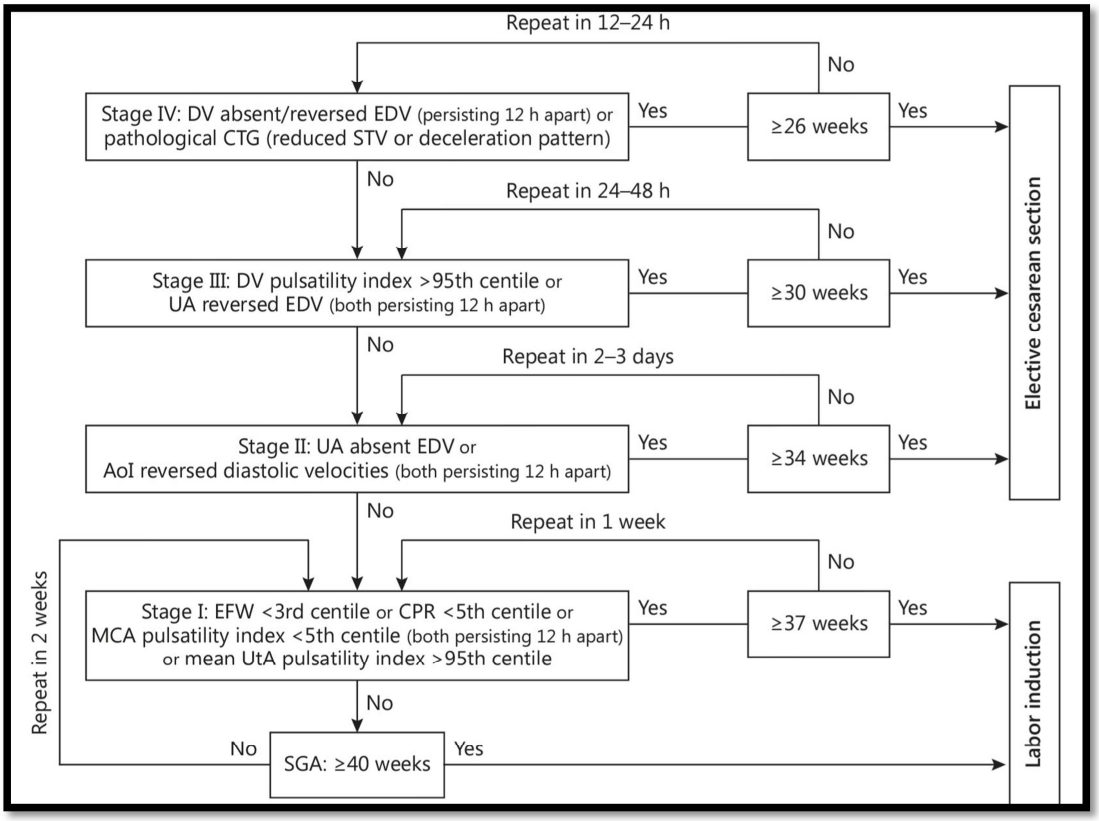


FIGURE : Figure showing stage based management of FGR

REVIEW FROM OTHER STUDY :

A study was conducted by Annapurna SRIRAMBHATLA, Saurabh MITTAL at 3 different hospitals in india in the department of radiodiagnosis on 2022. The purpose of the study was to assess the effectiveness of utilizing the pulsatility index (PI) measurements from the fetal umbilical artery (UA) and middle cerebral artery (MCA) during the third trimester of pregnancy as predictors for adverse perinatal outcomes among fetuses affected by growth restriction.

This study analysed eighty singleton pregnancies in the third trimester, all diagnosed with fetal growth restriction (FGR). The findings indicated that abnormal pulsatility in fetal vessels was linked to adverse perinatal outcomes. Among the parameters studied, the pulsatility index (PI) of the umbilical artery (UA) exhibited

the highest sensitivity at 66%, while the cerebroplacental ratio (CPR) demonstrated the greatest specificity at 80% for predicting adverse perinatal outcomes. In both early-onset fetal growth restriction (EFGR) and late-onset fetal growth restriction (LFGR), the pulsatility index (PI) of the umbilical artery (UA) emerged as the most sensitive parameter, with sensitivities of 70% and 66% respectively. Furthermore, it proved to be a specific Doppler parameter in early-onset fetal growth restriction (EFGR), with a specificity of 75%. In cases where there was either absent or reversal of diastolic flow in the umbilical artery (UA), adverse perinatal outcomes were associated in 75% and 40% of cases, respectively. [51]

A study conducted by Cahit Yılmaz between February 1, 2020, and February 1, 2022, and carried out at the Department of Obstetrics and Gynecology, Inonu University School of Medicine. This study seeks to elucidate how various Doppler parameters, including the umbilicocerebral ratio (UCR), cerebroplacentouterine ratio (CPUR), aortic isthmus, renal artery, and umbilical vein flow Doppler, contribute to the prediction of adverse neonatal outcomes in fetuses experiencing late-onset fetal growth restriction.This study included 141 patients for analysis with in the gestational age from 32 to 39 weeks. The performance of umbilical venous blood flow doppler in predicting adverse neonatal outcomes was found to be superior, exhibiting an area under the curve of 0.952 (95% confidence interval: 0.902-0.981, $p<0.001$). In the multivariate logistic regression analysis, it was observed that fetuses with abnormal cerebroplacentouterine ratio (CPUR) had a 4.5-fold increased risk of adverse neonatal outcomes (95% CI: 0.084-0.583, $p=0.02$), while those with abnormal umbilical venous flow exhibited a 1.07-fold increased risk (95% CI: 0.903-0.968, $p<0.001$). The findings of this study indicate that incorporating umbilicocerebral ratio (UCR), cerebroplacentouterine ratio (CPUR), umbilical venous flow, and aortic isthmus

pulsatility index (PI) Doppler parameters, along with umbilical artery PI and cerebroplacental ratio (CPR), proves to be effective in predicting adverse neonatal outcomes in fetuses afflicted with late-onset fetal growth restriction. [53]

Cesaltina Soares Muniz, Beatriz Frota Dias, Paula Vitória Pereira Motoyama, Camila Timbó Catunda Almeida did a retrospective observational cohort study between January 2018 to April 2019. The objective of this study was to assess and contrast Doppler changes and perinatal results in pregnant women experiencing either early or late onset fetal growth restriction (FGR). Excluding cases of twin pregnancies, major fetal structural malformations, or congenital infections was necessary for the study's focus or criteria. Early-onset fetal growth restriction (FGR), characterized by a lower prevalence of around 20%, is particularly concerning due to its association with higher maternal and fetal morbidity and mortality compared to late-onset FGR.

One of the distinguishing features of early-onset FGR is its association with maternal hypertensive disease and increased impedance of uterine arteries detected via Doppler ultrasound. This impedance is typically above the average normal value for gestational age and can sometimes exceed the 95th percentile. In cases of early-onset FGR, Doppler ultrasound of the umbilical artery serves as a valuable parameter for predicting the severity of the condition.

Early impairment of umbilical artery Doppler findings is linked with adverse perinatal outcomes, which are notably worse compared to outcomes associated with late-onset FGR. This distinction underscores the critical role of early detection and monitoring in managing pregnancies affected by FGR, especially those presenting with early-onset forms . [64]

A Comparative study of Umbilical Artery Doppler Indices done between Healthy and Growth-Restricted Fetuses in Lagos by Abayomi Ayyuub Adedo, Rasheed Ajani Arogundade, Adeyemi Adebola Okunowo from October 2017 to June 2018. This case-control study enrolled a total of one hundred and eighty pregnant women, consisting of 90 with pregnancies affected by Fetal Growth Restriction (FGR) and 90 with normal pregnancies. The study compared the Umbilical Artery Doppler Indices (UADI) and clinical outcomes (such as preterm delivery, birth weight, perinatal death, etc.) between normal and FGR fetuses. The study found significant differences between pregnancies affected by Fetal Growth Restriction (FGR) and normal pregnancies (controls) in several key outcomes. FGR pregnancies had a mean estimated fetal weight of 2.76 ± 0.66 kg, significantly lower than the 3.62 ± 0.37 kg observed in normal pregnancies ($P < 0.0001$). Similarly, FGR pregnancies exhibited a lower mean APGAR score at 5 minutes (6.93 ± 1.72) compared to controls (8.03 ± 0.94) ($P < 0.0001$). Abnormal umbilical artery Doppler waveforms were prevalent among FGR pregnancies, with 27.8% showing decreased end-diastolic flow, 7.8% absent end-diastolic flow, and 4.4% reversed end-diastolic flow. The incidence of preterm deliveries was markedly higher among FGR pregnancies (82.2%) compared to controls (7.8%), and there were six deaths recorded among FGR cases (two perinatal and four neonatal deaths), while no deaths occurred in the control group. These findings highlight the severe adverse outcomes associated with FGR, including compromised fetal growth, poorer immediate post-birth health indicators, abnormal umbilical artery Doppler patterns, increased risk of preterm birth, and higher mortality rates. [65]

A multicenter retrospective study conducted byA. DALL'ASTA , T. STAMPALIJA,, F. MECACCI, M. MINOPOLI, G. B. L. SCHERA Between 2014

and 2019. The objective of the study was to assess the correlation between Doppler and biometric ultrasound parameters measured at the time of diagnosis and the occurrence of perinatal adverse outcomes in a cohort of late-onset growth-restricted (FGR) fetuses.The study focused on non-anomalous singleton pregnancies affected by late-onset Fetal Growth Restriction (FGR) occurring at or after 32 weeks of gestation. FGR was defined as either abdominal circumference (AC) or estimated fetal weight (EFW) falling below the 10th percentile for gestational age. The study enrolled 468 cases with thorough biometric assessments and Doppler data for umbilical, fetal middle cerebral, and uterine artery (UtA). Within this cohort, 53 cases (11.3%) encountered CAPO (Composite Adverse Perinatal Outcome).

In logistic regression analysis, only the EFW percentile independently correlated with Composite Adverse Perinatal Outcome (CAPO) (P=0.01) and admission to the NICU (P<0.01). Furthermore, a mean uterine artery (UtA) pulsatility index (PI) multiples of the median (MoM) >95th percentile at diagnosis independently associated with obstetric interventions due to intrapartum fetal distress (P=0.01). The model, incorporating baseline pregnancy characteristics and the EFW percentile, yielded an area under the receiver-operating-characteristics curve of 0.889 (95% CI, 0.813–0.966) for predicting CAPO (P<0.001). A cutoff EFW value corresponding to the 3.95th percentile effectively discriminated between cases with and without CAPO, achieving a sensitivity of 58.5% (95% CI, 44.1–71.9%) and specificity of 69.6% (95% CI, 65.0–74.0%). The positive predictive value was 19.8% (95% CI, 13.8–26.8%), and the negative predictive value was 92.9% (95% CI, 89.5–95.5%). [66]

Chirtrarasan P et all did a study for the period of January 2013 to August 2016 in Government Vellore Medical College, Vellore, Tamilnadu, India. The

objective of the study was to ascertain and contrast the precision of different Doppler parameters in predicting perinatal outcomes. A prospective examination involving 200 singleton pregnancies, occurring between 34 to 36 weeks of gestation and complicated by intrauterine growth restriction, underwent Doppler ultrasound assessment of the umbilical artery, middle cerebral artery, and ductus venosus. Out of the 200 cases recruited, 169 resulted in live births, while 24 ended in neonatal death. Out of the live births, 32 cases experienced increased perinatal morbidity. The absence of end-diastolic flow (EDF) or its reversal in the umbilical artery demonstrated a high positive predictive value for predicting adverse fetal outcomes. Alterations in the ductus venosus appear to be a foreboding indication of a severely compromised fetus, correlating with a bleak perinatal outcome. [52]

MATERIALS AND METHODS

Source of Data:

Pregnant women ≥ 28 weeks with ultrasonography diagnosed cases of FGR and who has delivered in KAHER's Dr. Prabhakar Kore Charitable Hospital and Medical Research Centre, Nehru Nagar, Belagavi -10 during the study period

The criteria set for fetal growth restriction (FGR) included an estimated fetal birth weight (EFW) or abdominal circumference (AC) measuring below the 10th percentile or both for the corresponding gestational age with or without umbilical artery doppler abnormality. Fetuses meeting the criteria outlined above, with a gestational age of 32 weeks or more, were categorized as having late-onset fetal growth restriction (FGR).

Study Design: Prospective observational study

Study Period: One year (June 2023 to May 2024)

Sample Size:

Formula used for sample size calculation is,

$$n = \frac{\widehat{Se}\left(1 - \widehat{Se}\right)Z_{\frac{\propto}{2}}{}^{2}}{Prev * d^{2}}$$

where n is the sample size required, $\widehat{Se}$ is the pre-determined values of sensitivity, d is the maximum marginal error required, $Z_{\frac{\propto}{2}}$ is the value corresponding to level of confidence required and Prev is the prevalence.

The UA PI had 66% sensitivity for predicting adverse perinatal outcomes. The prevalence of adverse outcome was 48.8%. Considering similar result at 95% confidence level and 10% maximum error, the sample size is given by,

$$n = \frac{0.66 \text{ x } (1 - 0.66) \text{ x } 1.96^2}{0.488 \text{ x } 0.1^2}$$

$$n = 176.6506 \approx 177$$

Hence, minimum sample size required was 177. As sample size increases, accuracy of result also increases.

INCLUSION CRITERIA:

- Singleton pregnancy
- Gestational age ≥ 28 weeks
- Dating scan done (first or second trimester scan)
- Expected fetal weight <10 % or AC < 10 % and or both as per recent USG scan

EXCLUSION CRITERIA:

Fetal congenital anomalies diagnosed on USG

DATA COLLECTION PROCEDURE:

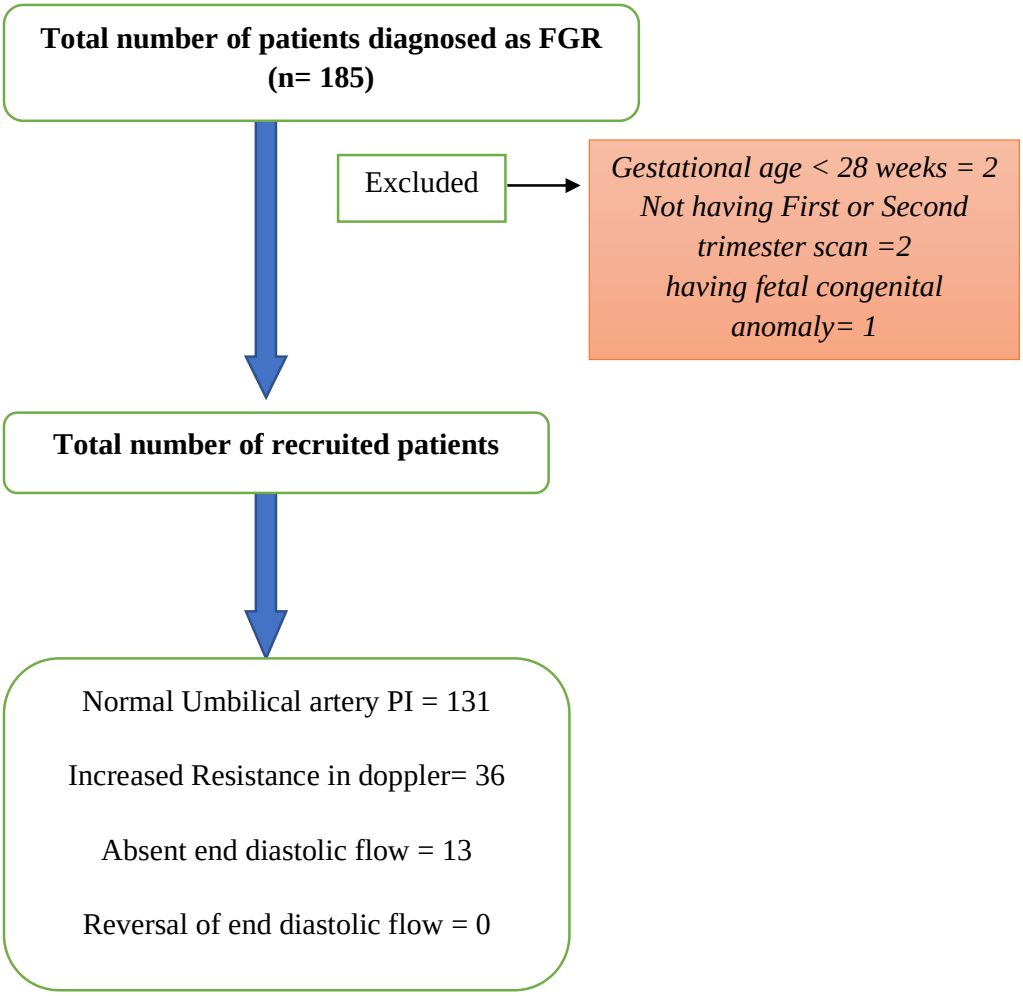
The steps used for data collection as follows:

After obtaining the approval from ethical committee and a written informed consent, Subjects are recruited according to the inclusion and exclusion criteria.

A detailed history with physical examination was taken and Ultrasonographic (USG) diagnosis of FGR was done.

Patients diagnosed as FGR (AC or EFW < 10% or both) are included in the study. They are followed upto delivery with umbilical artery doppler measurements and the neonate is followed upto 7 days of birth.

Strobe Diagram:



RESULTS

Data processing and analysis/statistical analysis:

Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. Data was also represented using appropriate diagrams like bar diagram, pie diagram and box plots. The association between explanatory variables and categorical outcomes was assessed by cross tabulation and comparison of percentages. Continuous variables will be represented using mean ± SD/median (minimum, maximum). Chi square test was used to test statistical significance.

NICU admission was considered as gold standard for predicting adverse perinatal outcome. Umbilical Artery PI doppler was considered as screening test the sensitivity, specificity, predictive values, and diagnostic accuracy of the screening test along with their 95% CI were presented.

P value < 0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis. (1)

1. IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.

Table 1: Descriptive analysis of Demographic variables (age and BMI) in study population (n=180)

Parameter	Mean ± SD	Median	Minimum	Maximum	95% C.I	
					Lower	Upper
Age (years)	25.38 ± 4.88	24.0	18.0	45.0	24.7	26.1
BMI (kg/m$^{2)}$	24.95 ± 3.41	24.4	17.3	34.6	24.5	25.5

- Table 1 shows us the demographic parameters of the study participants. The mean age of the study participants was 25.38 years while the BMI was 24.95 kg/m2 .

Figure 1: Pie chart distribution of parity in the study population (n=180)

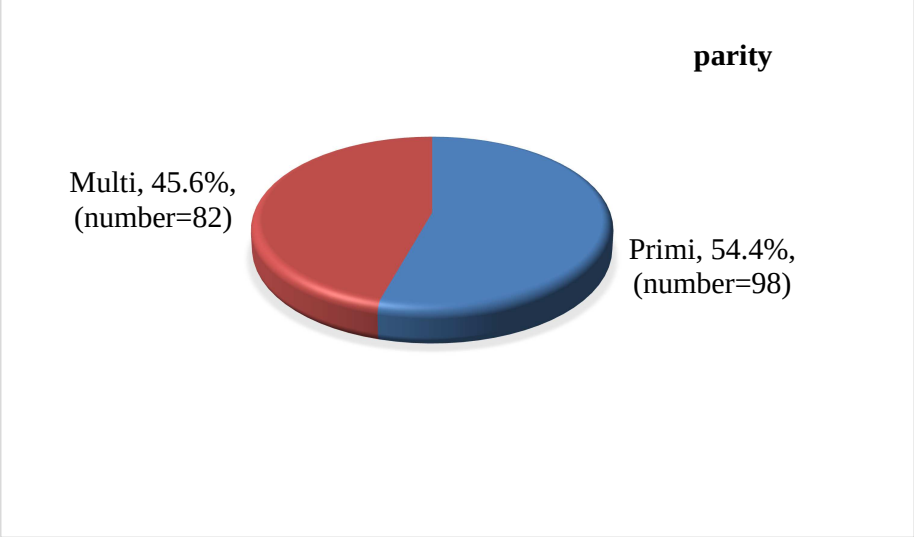


Figure 1 shows that a 54.44% were Primigravida, while the remaining were multigravida

Table 2: prevalence of early and late onset FGR in the study population (n=180)

FGR	Frequency	Percentages
Early Onset FGR	29	16.11%
Late Onset FGR	151	83.89%

Classification of study population based on the onset of FGR is vital to determining the findings of UA doppler and its association with FGR, and outcomes.

In table 2, we can see that majority of the population was late-onset FGR, i.e 83.89%.

Table 3 : Comparison of common risk factors factors between FGR (n=180)

Parameter	FGR		Chi square	Fisher exact P value
	Early Onset FGR (N=29)	Late Onset FGR (N=151)		
Gestational HTN	8 (27.59%)	17 (11.26%)	5.423	0.035
Preeclampsia	9 (31.03%)	12 (7.95%)	12.583	0.002
Abruptio Placenta	2 (6.9%)	2 (1.32%)	3.476	0.122

- FGR can have association with several maternal high risk factors. There is statistical significant difference noted in association with gestational HTN, Preeclampsia between early and late onset FGR. (Table 3)
- Among overall study population 3 were GDM, 3 were a diagnosed case of RHD, 4 were chronic hypertension & another 2 were associated with chronic HTN with superimposed PE.

Table 4: Descriptive analysis of AC (%) , EFW(%) and AFI (cm)in study population (n=180)

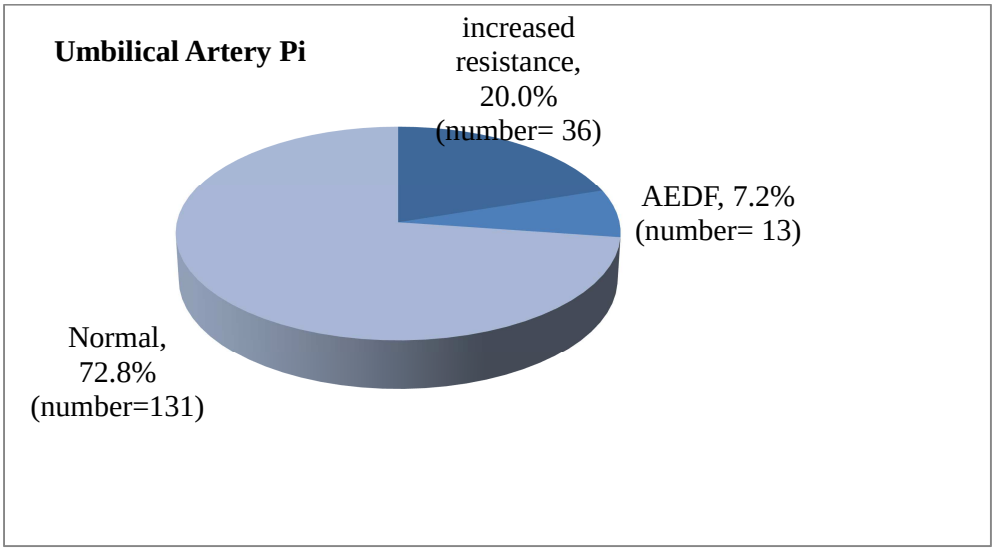
Parameter	Mean ± SD	Median	Minimum	Maximum	95% C.I	
					Lower	Upper
AC (%)	13.26 ± 12.97	7.0	1.0	70.0	11.4	15.2
EFW (%)	7.14 ± 7.57	4.0	1.0	62.0	6.0	8.3
AFI (cm)	9.64 ± 3.92	9.7	0.0	24.8	9.1	10.2

There are several parameters needed for diagnosis of FGR such as AC and EFW. Other than that AFI is a necessary parameter which helps in management if FGR.

In Table 4, we observed the mean AFI was lower than 10, which is relevant of FGR.

Similarly, the abdominal circumference and estimated foetal weight was lower than expected.

Figure 2 : Pie chart of umbilical artery PI in the study population (n=180)

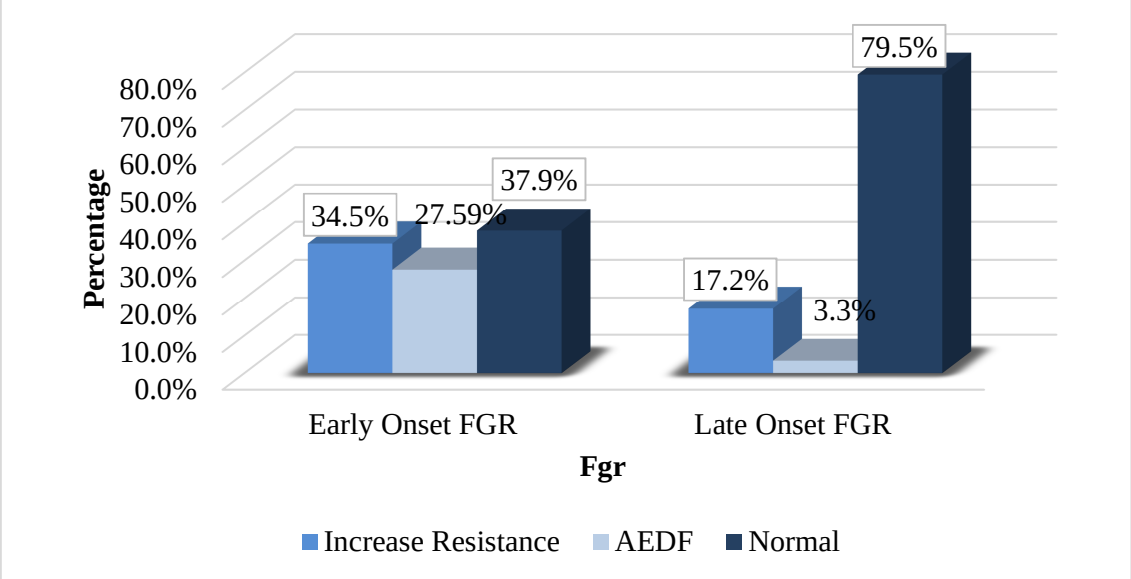


- In this study, figure 2 we find that 20% (36 cases) had increased resistance, while 7.22 % (13 cases) had AEDF.
- Majority of cases are associated with normal umbilical artery pulsatility index (UA PI), comprising 72.8% of the study population. Meanwhile, 27.22% of cases are associated with abnormal UA Doppler, encompassing both increased resistance and absent end-diastolic flow (AEDF). This suggests a significant proportion of cases exhibit abnormalities in UA Doppler, which can be indicative of potential fetal health issues.

Table 5: Descriptive analysis of umbilical artery PI in the study population (n=180)

Parameter	FGR		Chi square	P value
	Early Onset FGR (N=29)	Late Onset FGR (N=151)		
Umbilical Artery Pi				
Abnormal (increased resistance & AEDF)	18 (62.07%)	31 (20.53%)	21.188	<0.001
Normal	11 (37.93%)	120 (79.47%)		
Umbilical Artery PI				
Increased Resistance	10 (34.48%)	26 (17.22%)	29.243	<0.001
AEDF	8 (27.59%)	5 (3.31%)		
Normal	11 (37.93%)	120 (79.47%)		

Figure 3: Cluster bar chart of comparison of umbilical artery pi between FGR (n=180)

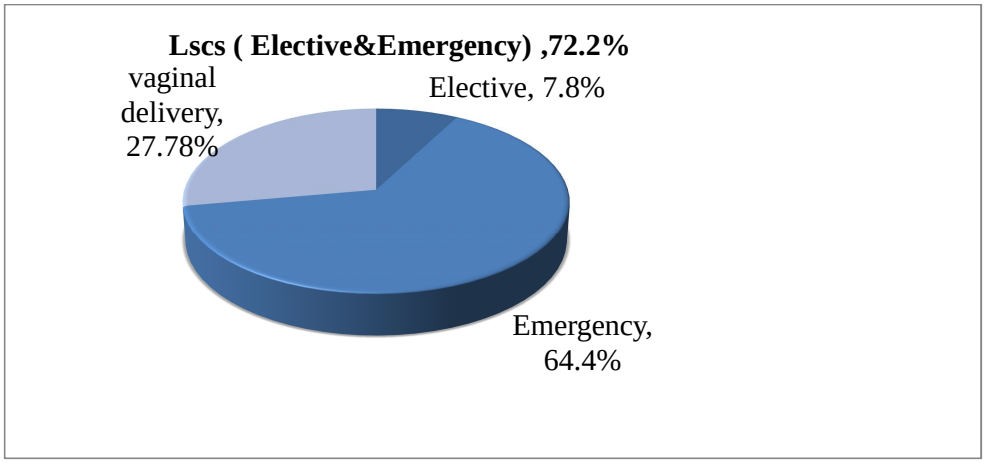


- Early onset FGR cases had a higher percentage (62.07%) of abnormal umbilical artery Doppler findings compared to late onset FGR cases (17.22%).
- Specifically, increased resistance was more common in both early onset (34.48%) and late onset (17.22%) FGR cases, but relatively more prevalent in early onset cases.
- AEDF was also observed more frequently in early onset FGR cases (27.59% vs. 3.31% in late onset).

  Therefore, based on the data provided from Table 5 and Figure 3, it's evident that early onset FGR is more commonly associated with abnormal umbilical artery Doppler findings compared to late onset FGR.

Statistical analysis revealed a significant difference in umbilical artery pulsatility index (PI) between early and late onset fetal growth restriction (FGR) groups, with a p-value of less than <0.001. (Table 5)

Figure 4: Pie chart of mode of delivery (vaginal delivery/LSCS) in the study population (n=180)



The most common mode of delivery, as depicted in figure 4, was LSCS which account for 72.2% of study population. vaginal delivery observed in 27.78% of study population Amongst the LSCS cases, majority were emergency cases (64.4%). (figure 4)

Table 6: Comparison of mode of delivery in patients with abnormal umbilical artery PI (n=180)

Mode Of Delivery	Umbilical Artery PI			Chi square	P value
	Increased Resistance (n=36)	AEDF (n=13)	Normal (n=131)		
Overall (n=180)					
Vaginal Delivery	9 (25%)	1 (7.69%)	40 (30.53%)	3.249	0.197
LSCS	27 (75%)	12 (92.31%)	91 (69.47%)		
Early onset FGR (n=29)					
	Increased Resistance (n=10)	**AEDF (n=8)**	**Normal (n=11)**	**Chi square**	**P value**
Vaginal Delivery	2 (20%)	1 (12.5%)	2 (18.18%)	0.186	0.911
LSCS	8 (80%)	7 (87.5%)	9 (81.82%)		
Late onset FGR (n=151)					
	Increased Resistance (n=26)	**AEDF (n=5)**	**Normal (n =120)**	**Chi square**	**P value**
Vaginal Delivery	7 (26.92%)	0 (0%)	38 (31.67%)	2.425	0.297
LSCS	19 (73.08%)	5 (100%)	82 (68.33%)		

- In all study population there was a higher proportion of LSCS compared to Vaginal Delivery across all categories of Umbilical Artery PI. Specifically, LSCS is more frequent in cases with Increased Resistance (75% vs. 25%) and

Normal Umbilical Artery PI (69.47% vs. 30.53%).AEDF cases also show a higher tendency for LSCS (92.31% vs. 7.69%).(Table 6, figure 5)

- The Chi-square test with its associated P values (0.197) for all study population suggests that while there are differences in distribution between Vaginal Delivery and LSCS across Umbilical Artery PI categories, these differences are not statistically significant (P > 0.05).(Table 6)

Figure 5 : Cluster bar chart of comparison of mode of delivery in patients with umbilical artery PI (n=180)

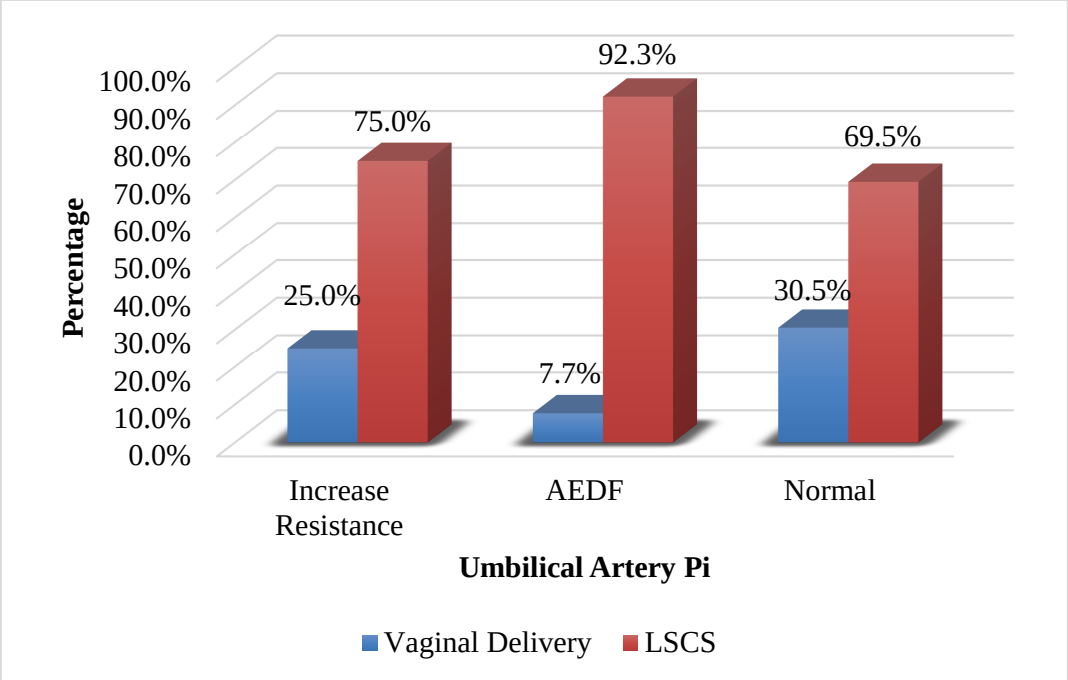
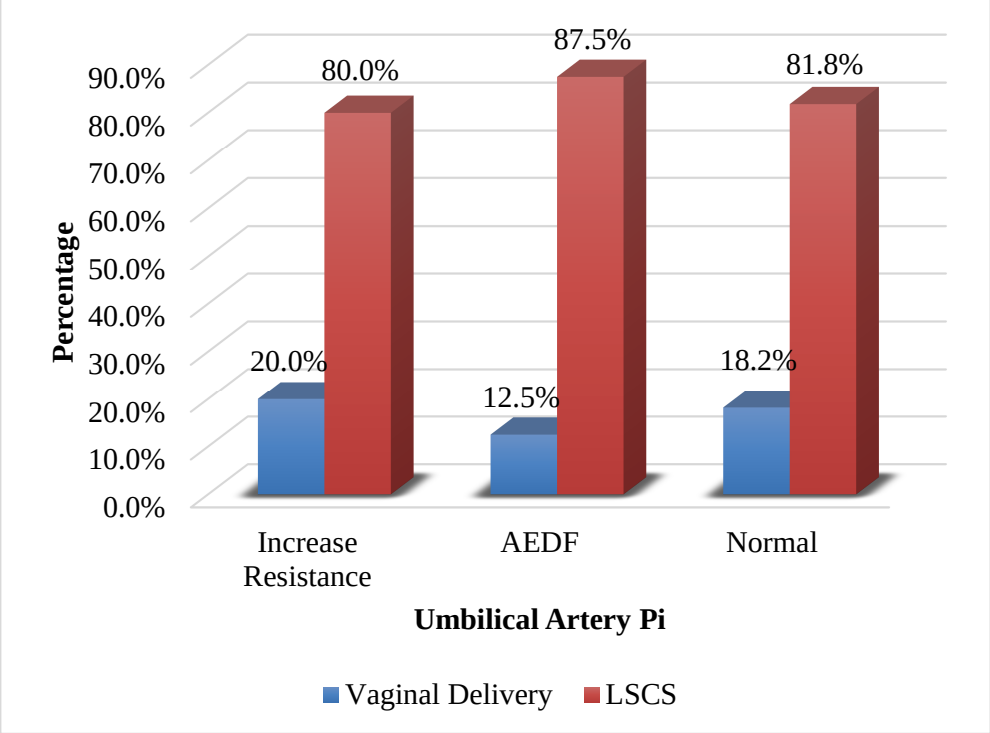
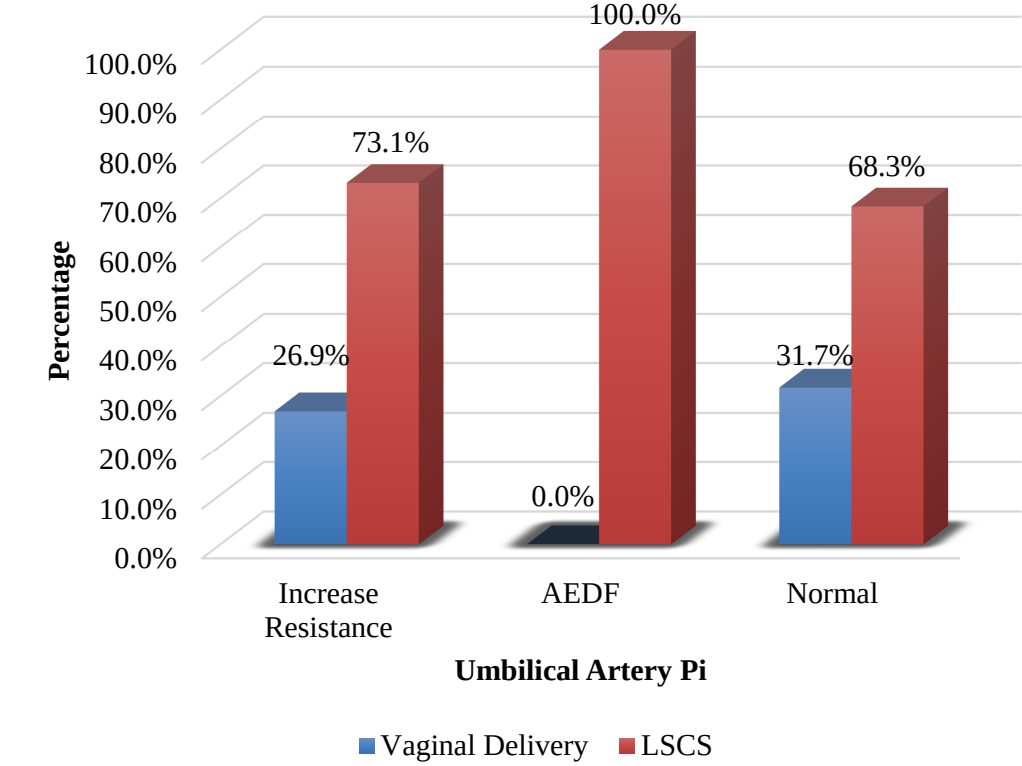


Figure 6: Cluster bar chart of comparison of mode of delivery with umbilical artery PI in Early onset FGR population (n=29)



- In pregnancies with Early onset FGR, LSCS is more frequently performed across all Umbilical Artery PI categories. Notably, AEDF cases have a higher proportion of LSCS (87.5% vs. 12.5%).The Chi-square test indicates no significant difference in the distribution of mode of delivery across Umbilical Artery PI categories (P = 0.911).(table 6, Figure 6)

Figure 7: Cluster bar chart of comparison of mode of delivery with umbilical artery PI in Late onset FGR population (n=151)



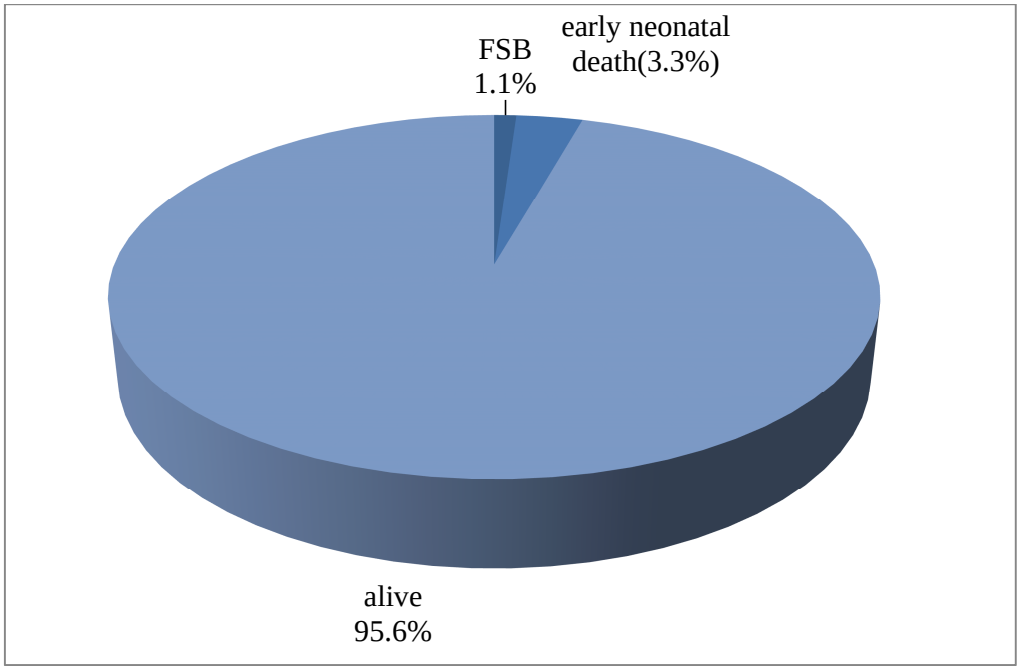
- In pregnancies with Late onset FGR, LSCS is more frequent, especially in AEDF cases (100%).There is a higher proportion of LSCS in cases with Increased Resistance (73.08% vs. 26.92%) and Normal Umbilical Artery PI (68.33% vs. 31.67%).The Chi-square test suggests no significant difference in the distribution of mode of delivery across Umbilical Artery PI categories (P = 0.297).(Table 6, Figure 7)

Table 7: Indication for LSCS in the study population (n=180)

Indication For LSCS	Frequency	Percentages
Foetal Distress	33	18.33%
Previous LSCS	26	14.44%
Oligohydramnios	15	8.33%
AEDF	12	6.72%
Failed Induction	7	3.89%
Non-Progress of Labour	7	3.89%
Anamnios	5	2.78%
Brain Sparing Effect	5	2.78%
Breech Presentation	4	2.22%
Severe PEwith Imminent Sign	3	1.67%
Antepartum Eclampsia	2	1.11%
CDMR	2	1.11%
CPD	2	1.11%
HELLP Syndrome	2	1.11%
Atypical PE	1	0.56%
Complete Placenta Previa	1	0.56%
Deep Transverse Arrest	1	0.56%
Placenta Previa	1	0.56%
Abruptio Placenta	1	0.56%

The study population exhibited several reasons for performing LSCS, with foetal distress identified as the most frequent indication, followed by a history of previous LSCS. Other commonly observed indications included AEDF, anamnionitis, oligohydramnios, failed induction, and the brain sparing effect (see Table 7).

Figure 8: Pie chart of perinatal outcome of Neonate (n=180)

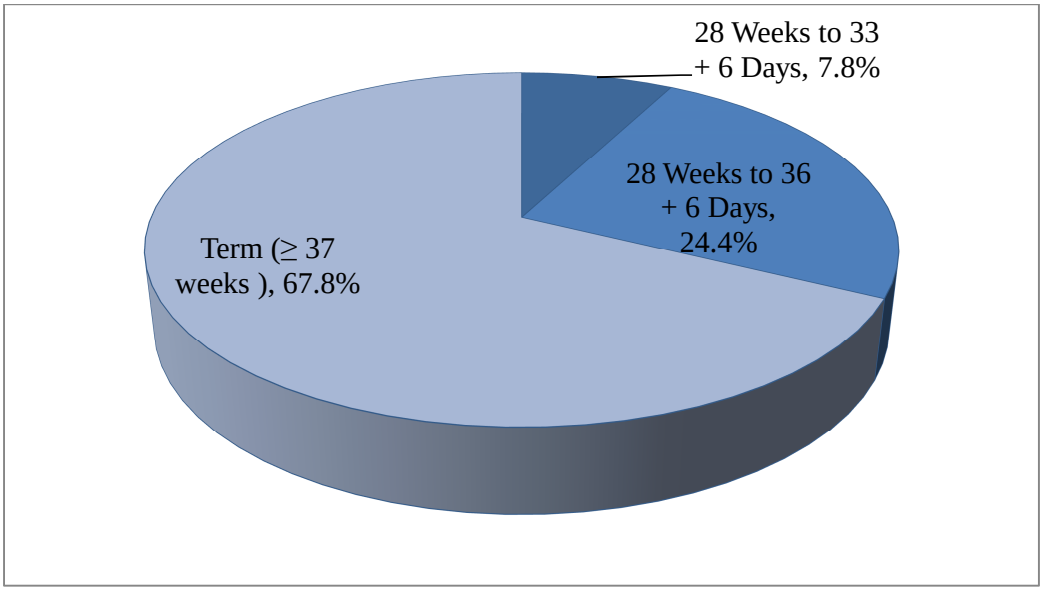


Safe childbirth is essential in all deliveries, and it is important in those with IUGR and abnormal UA dopplers. 98.98% were alive at birth that account for 178 number of study population. Two Fresh still birth (FSB) were noted. Six early neonatal death observed other than 2 FSB (Figure 8)

Table 8: Distribution of term/preterm neonate in the study population (n=180)

Gestational Age at birth	Frequency	Percentages
28 Weeks to 33^{+6} weeks	14	7.78%
34 Weeks to 36^{+6} weeks	44	24.44%
Term (≥ 37 weeks)	122	67.78%

Figure 9: Pie chart of term/preterm delivery in the study population (n=180)



The table no 8 & Figure no 9 show the distribution of births across different gestational age categories.

The majority of births (67.78%) occurred at term (37 weeks of gestation or later), indicating that full-term pregnancies are the most common.

Preterm births (between 28 and 36 weeks + 6 days) accounted for a smaller proportion of births: 7.78% for 28 weeks to 33^{+6} weeks and 24.44% for 34 weeks to 36^{+6} weeks.

Table 9: Descriptive analysis of birth weight (kg), APGAR at 1 min and APGAR at 5 min in study population (n=180)

Parameter	Mean ± SD	Median	Minimum	Maximum	95% C.I	
					Lower	Upper
Birth Weight (Kg)	2.17 ± 0.44	2.3	0.6	2.9	2.1	2.2
Apgar 1 Min	6.83 ± 1.09	7.0	0.0	8.0	6.7	7.0
Apgar 5 Min	8.04 ± 1.17	8.0	0.0	9.0	7.9	8.2

The mean birth weight was lower than expected at term, with a mean birth weight of 2.17 kg (table 9). The APGAR at 1 min was lower than normal and at 5 min was well within normal ranges.

Table 10: Comparison of birth weight (kg), APGAR and NICU admission between early and late onset FGR (n=180)

Parameter	FGR		Chi square	P value
	Early Onset FGR (N=29)	Late Onset FGR (N=151)		
Birth Weight (Kg)				
Low Birth Weight (<2500Gm)	28 (96.55%)	115 (76.16%)	6.195	0.013
Normal Birth Weight (≥ 2500Gm)	1 (3.45%)	36 (23.84%)		
Apgar 1 Min				
Abnormal (<7)	22 (75.86%)	27 (17.88%)	41.282	<0.001
Normal (≥ 7)	7 (24.14%)	124 (82.12%)		
Apgar 5 Min				
Abnormal (<7)	6 (20.69%)	4 (2.65%)	15.090	0.001
Normal (≥ 7)	23 (79.31%)	147 (97.35%)		
NICU Admission				
Yes	22 (75.86%)	57 (37.75%)	14.350	<0.001
No	7 (24.14%)	94 (62.25%)		

Table 10 shows among infants with Early Onset FGR, the vast majority (96.55%) had low birth weight (LBW), while a very small percentage (3.45%) had normal birth weight.

In contrast, among infants with Late Onset FGR, a majority (76.16%) had low birth weight, and a smaller proportion (23.84%) had normal birth weight (≥ 2500Gm).

Early Onset FGR significantly associated with Low Birth Weight (<2500Gm) compared to Late Onset FGR (P = 0.013). (Table 10, Figure 10)

Figure 10: Cluster bar chart of comparison of birth weight (kg) between early & late onset FGR (n=180)

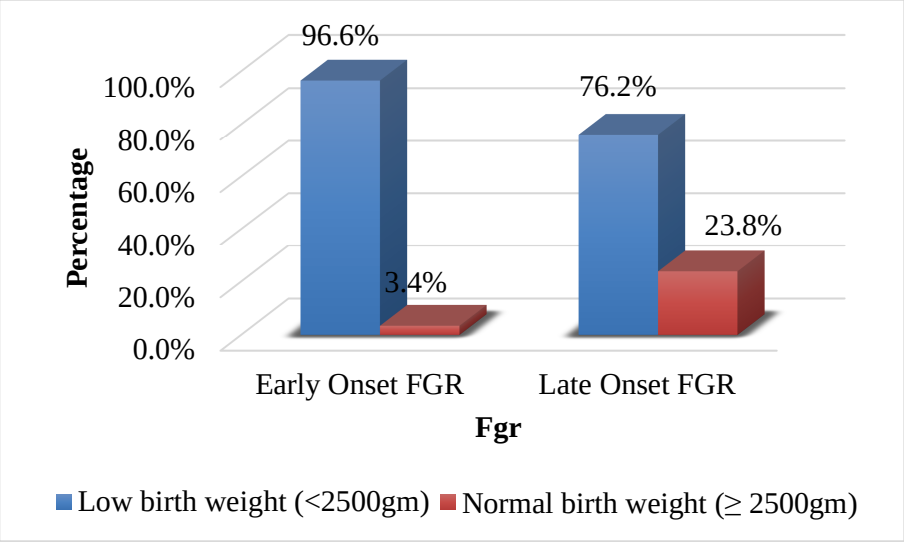
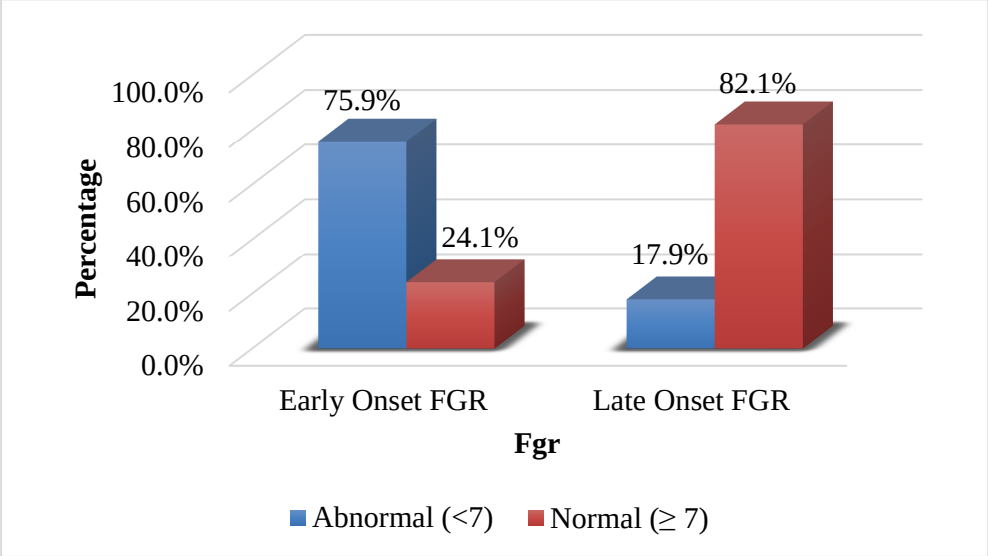


Figure 11: Cluster bar chart of comparison of Apgar 1 min between early and late onset FGR (n=180)



Early onset FGR showed a higher incidence (75.9%) of low Apgar scores at 1 minute compared to late onset FGR, where only 17.9% were associated with abnormal Apgar scores. Infants with early onset FGR are significantly more prone to lower Apgar scores at both 1 minute and 5 minutes compared to those with late onset FGR (both P < 0.001). (Table 10, Figure 11, 12)

Figure 12: Cluster bar chart of comparison of APGAR 5 min between early and late onset FGR (n=180)

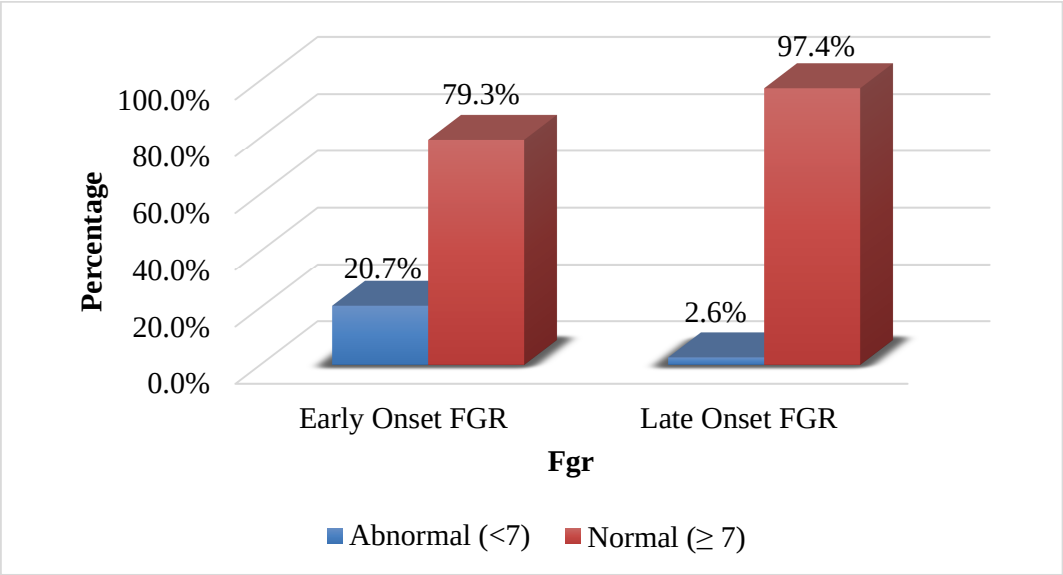
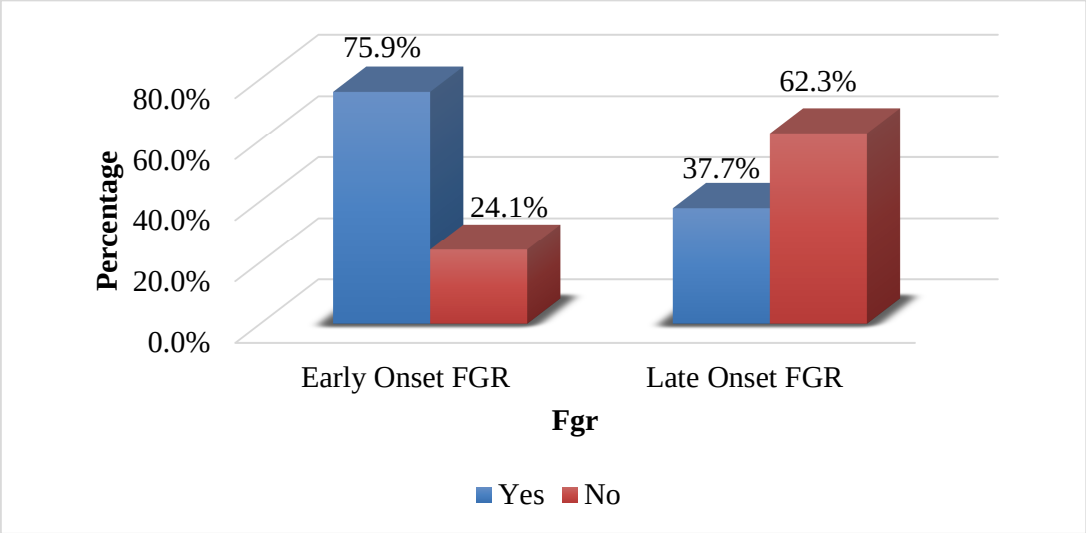


Figure 13 : Cluster bar chart of comparison of NICU admission between early and late onset FGR (n=180)



Early Onset FGR infants more likely to require NICU admission compared to Late Onset FGR ($P < 0.001$). (Table 10, Figure 13)

These results indicate that Early Onset FGR is associated with poorer outcomes such as lower birth weight, lower Apgar scores, and higher likelihood of NICU admission compared to Late Onset FGR.

Table 11: Comparison of mean of gestational age at birth between early and late onset FGR (n=180)

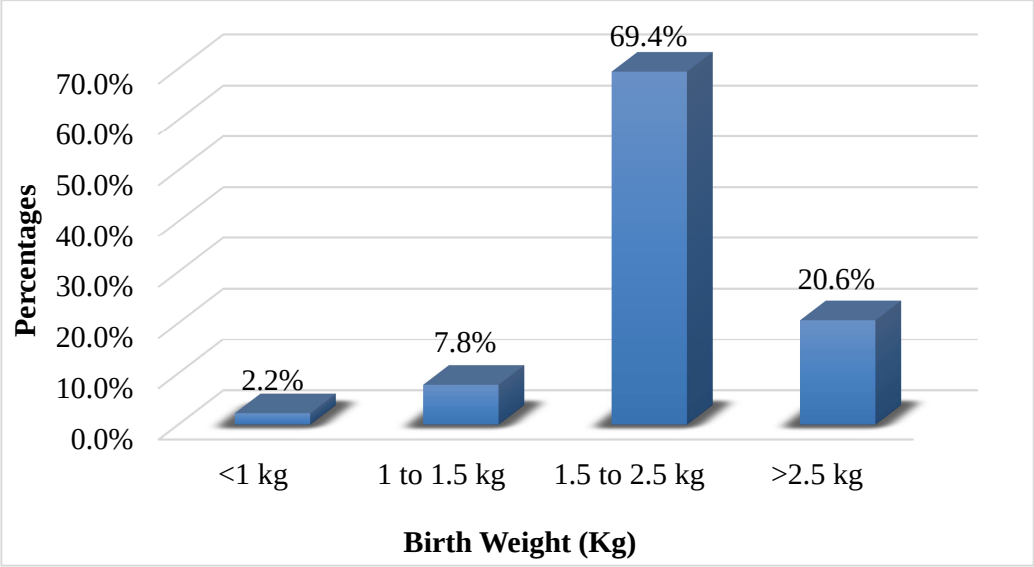
Parameter	FGR (Mean± SD)		P value
	Early Onset FGR (n=29)	Late Onset FGR (n=151)	
Gestational Age at Birth	34.57 ± 3.07	37.97 ± 1.71	<0.001
Apgar 1 Min	5.72 ± 1.83	7.05 ± 0.71	<0.001
Apgar 5 Min	7 ± 2.17	8.25 ± 0.7	<0.001

- The mean gestational age at birth for early & late onset FGR were 34.57 weeks & 37.97 weeks respectively .The difference in gestational age between early and late onset FGR was statistically significant (P< 0.001), indicating that infants with late onset FGR were born at a more gestational age compared to those with early onset FGR . (table 11)
- There was a statistically significant difference in Apgar scores at 1 minute and 5 minute between Early Onset FGR and Late Onset FGR (P < 0.001), with infants in the Late Onset FGR group having higher scores, indicating better initial neonatal adaptation. The mean APGAR scores for 1 min in early & late onset FGR were 5.72 and 7.05 respectively. Similarly in 5 min it were 7 & 8.25 respectively. (table 11)
- Infants with Late Onset FGR tended to be born at a later gestational age and showed higher Apgar scores at both 1 minute and 5 minutes compared to those with Early Onset FGR.(table 11)

Table 12: Descriptive analysis of birth weight (kg) in the study population (n=180)

Birth Weight (Kg)	Frequency	Percentages
<1 kg	4	2.22%
1 to 1.5 kg	14	7.78%
1.5 to 2.5 kg	125	69.44%
>2.5 kg	37	20.56%

Figure 14: Bar chart of birth weight (kg) in the study population (n=180)



The table 11 shows the distribution different birth weight categories in study population.

Most babies (69.44%) had birth weights between 1.5 kg and 2.5 kg, which typically fall within the low birth weight range categories.

Lower birth weight categories, such as <1 kg and 1 to 1.5 kg, together account for 9.00% of births, indicating a smaller proportion of babies born with very low birth weights.

Babies with birth weights greater than 2.5 kg accounted for 20.56% of births indicating normal birth weights, which are generally associated with better outcomes.(Table 12 & Figure 14)

Table 13: Comparison of umbilical artery PI with birth weight (kg) (n=180)

Parameter	Birth Weight (Kg)		Chi square	P value
	Low Birth Weight (<2500Gm) (n=143)	Normal Birth Weight (≥ 2500Gm) (n=37)		
Umbilical Artery Pi				
Increased Resistance	34 (23.78%)	2 (5.41%)	11.370	0.003
AEDF	13 (9.09%)	0 (0%)		
Normal	96 (67.13%)	35 (94.59%)		

In this study, among the 36 participants with increased resistance in umbilical artery doppler, 34 had low birth weight. All participants with absent end-diastolic flow (AEDF) were also delivered as low birth weight. Furthermore, among the normal birth weight population, 94.59% showed normal results in umbilical artery Doppler, while only 5.41% exhibited increased resistance. (Table 13, Figure 15)

Table 13 demonstrates that abnormalities in umbilical artery PI (including increased resistance and AEDF) are significantly associated with low birth weight.

Figure 15: Cluster bar chart of comparison of umbilical artery PI with birth weight (kg) (n=180)

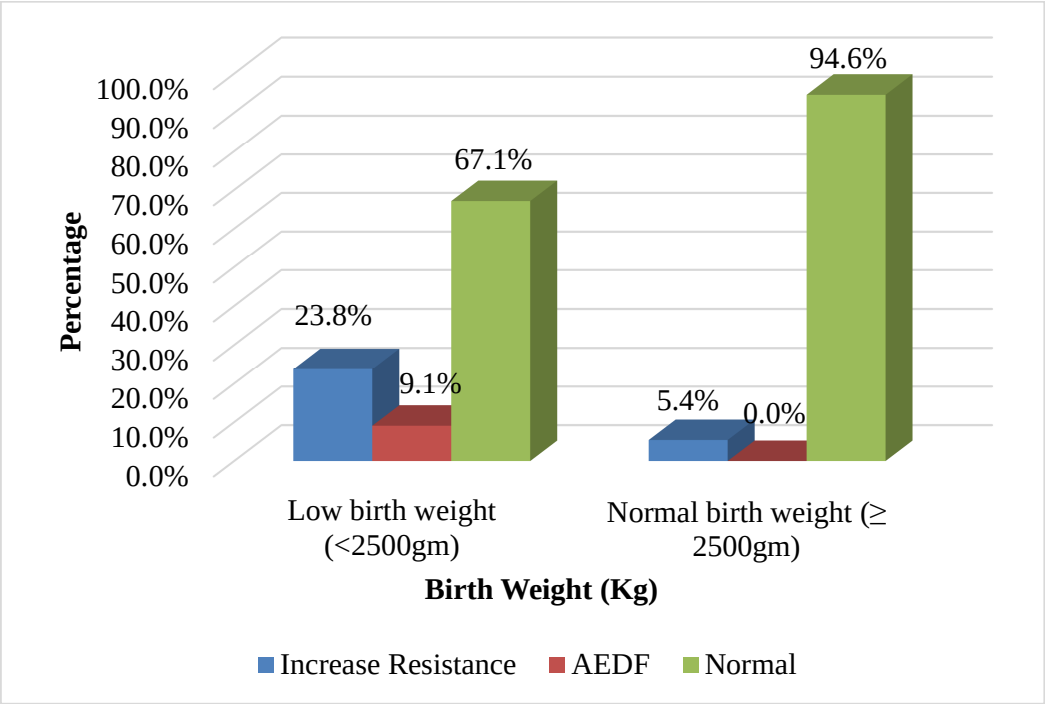


Table 14: Comparison of umbilical artery PI with birth weight (kg) (n=180)

Umbilical Artery Pi	Birth Weight (Kg)		Chi square	P value
	Low Birth Weight (<2500Gm) (n=143)	**Normal Birth Weight (≥ 2500Gm) (n=37)**		
Overall (N=180)				
Abnormal	47 (32.87%)	2 (5.41%)	11.189	<0.001
Normal	96 (67.13%)	35 (94.59%)		
Early onset FGR (N=29)				
	Low Birth Weight (<2500Gm) (n=28)	**Normal Birth Weight (≥ 2500Gm) (n=1)**	**Chi square**	**P value**
Abnormal	18 (64.29%)	0 (0%)	1.695	0.193
Normal	10 (35.71%)	1 (100%)		
Late onset FGR (N=151)				
	Low Birth Weight (<2500Gm) (n=115)	**Normal Birth Weight (≥ 2500Gm) (n=36)**	**Chi square**	**P value**
Abnormal	29 (25.22%)	2 (5.56%)	6.497	0.011
Normal	86 (74.78%)	34 (94.44%)		

Table 14 shows Within the early onset FGR subgroup of 29 participants, 18 (64.29%) had abnormal PI values, all of whom were in the low birth weight category. 10 participants (35.71%) with early onset FGR had normal PI values, 1 of whom was in the normal birth weight category & rest 9 were in low birth weight category (figure 17, Table 14)

However, the Chi-square test (1.695, P = 0.193) did not show a statistically significant association, possibly due to the small sample size.

Figure 16: Cluster bar chart of comparison of umbilical artery PI with birth weight (kg) (n=180)

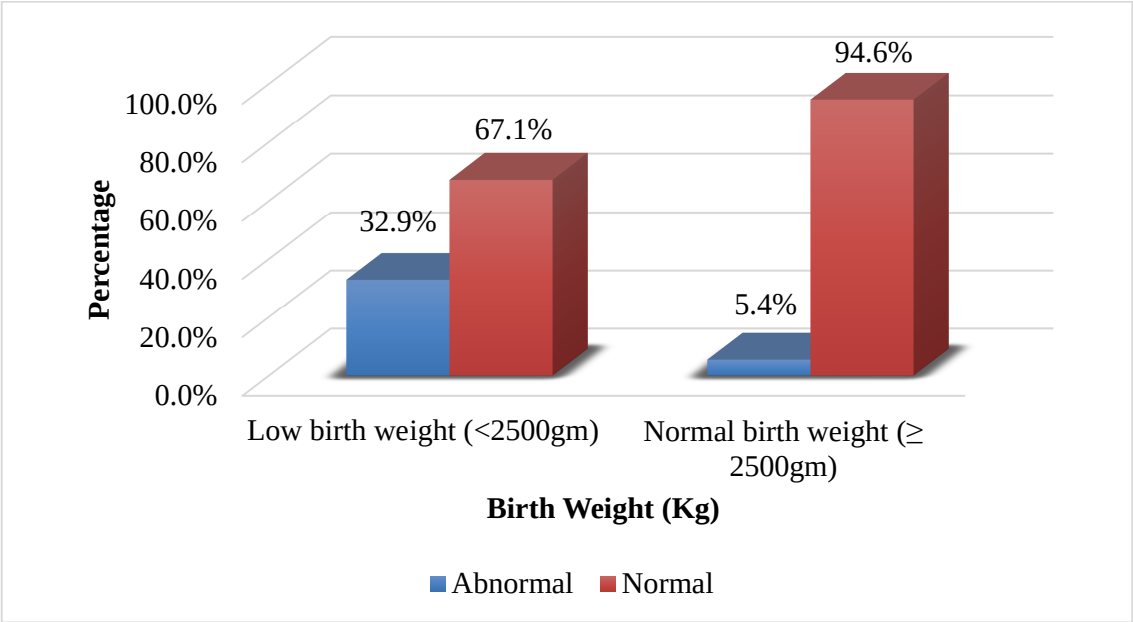


Figure 17: Cluster bar chart of comparison of umbilical artery PI with birth weight (kg) In Early onset FGR population (n=29)

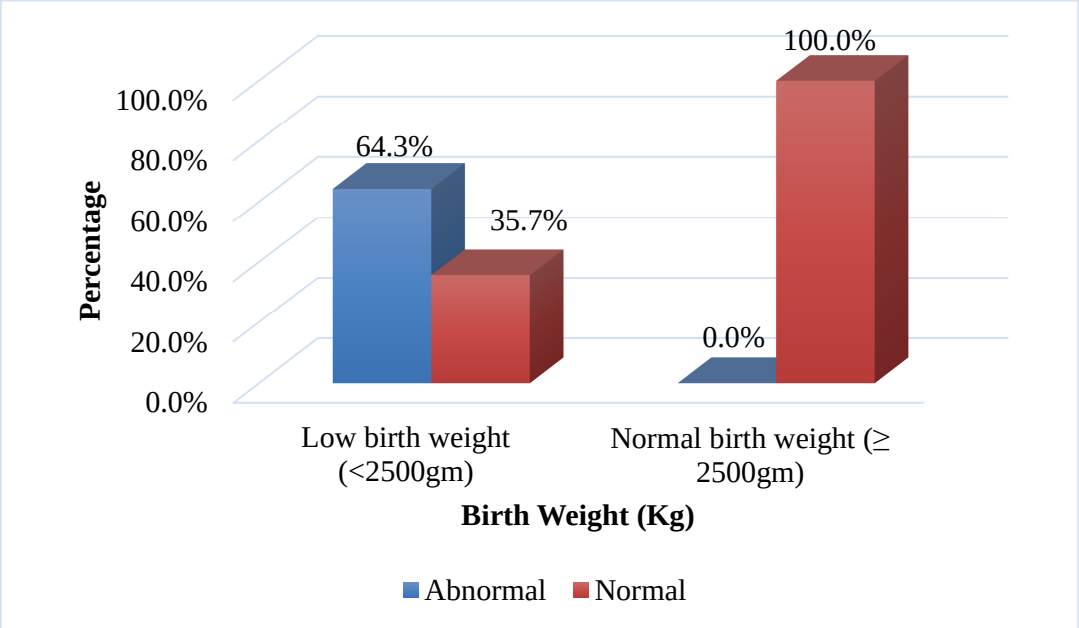
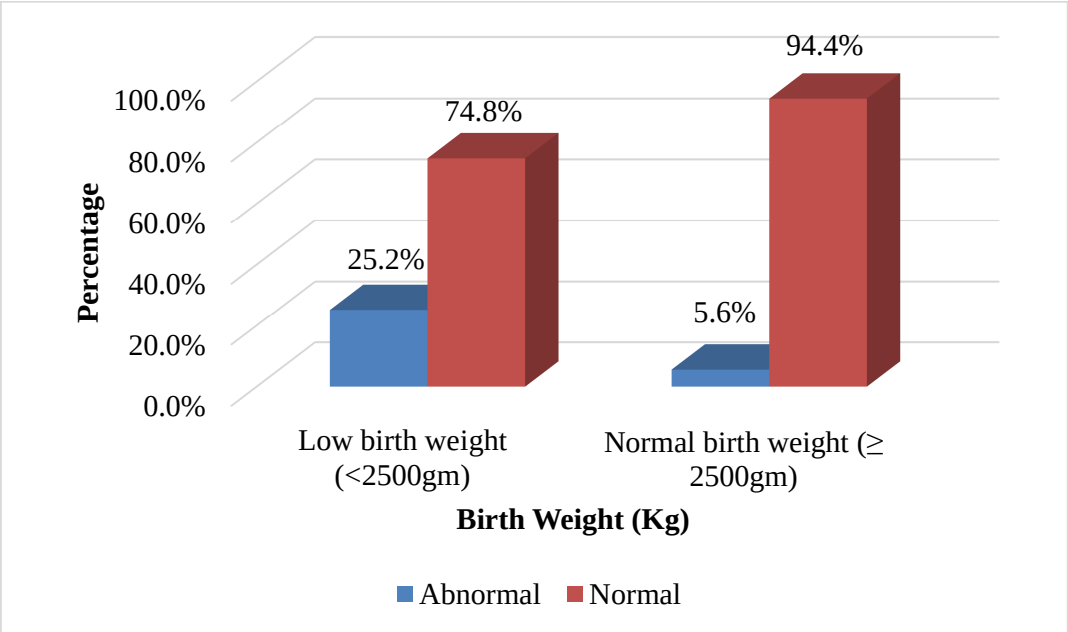


Figure 18: Cluster bar chart of comparison of umbilical artery PI with birth weight (kg) In Late onset FGR population (n=151)



- In the late onset FGR subgroup of 151 participants, 29 individuals with abnormal umbilical artery Pulsatility Index (PI) values were categorized as low birth weight, whereas only 2 individuals with abnormal PI were categorized as normal birth weight.

- Among those in the late onset FGR subgroup who were categorized as normal birth weight, 94.44% exhibited normal umbilical artery PI values, while only 5.56% had abnormal umbilical artery PI values.(Table 14, Figure 17)

- The Chi-square test (6.497, P = 0.011) confirms a statistically significant association between abnormal PI values and birth weight categories within this subgroup.(Table 14)

Table 15: Predictive validity of Umbilical artery PI in predicting Birth Weight (Kg) in FGR (n=180)

Parameter	Value	95% CI	
		Lower	Upper
Overall (n=180)			
Sensitivity	32.87%	25.25%	41.21%
Specificity	94.59%	81.81%	99.34%
False positive rate	5.41%	0.66%	18.19%
False negative rate	67.13%	58.79%	74.75%
Positive predictive value	95.92%	86.02%	99.50%
Negative predictive value	26.72%	19.37%	35.15%
Diagnostic accuracy	45.56%	38.13%	53.13%
Early onset FGR (n=29)			
Sensitivity	64.29%	44.07%	81.36%
Specificity	100.00%	2.50%	100.00%
False positive rate	0.00%	-	97.50%
False negative rate	35.71%	18.64%	55.93%
Positive predictive value	100.00%	81.47%	100.00%
Negative predictive value	9.09%	0.23%	41.28%
Diagnostic accuracy	65.52%	45.67%	82.06%
Late onset FGR (n=151)			
Sensitivity	25.22%	17.58%	34.17%
Specificity	94.44%	81.34%	99.32%
False positive rate	5.56%	0.68%	18.66%
False negative rate	74.78%	65.83%	82.42%
Positive predictive value	93.55%	78.58%	99.21%
Negative predictive value	28.33%	20.49%	37.28%
Diagnostic accuracy	41.72%	33.76%	50.02%

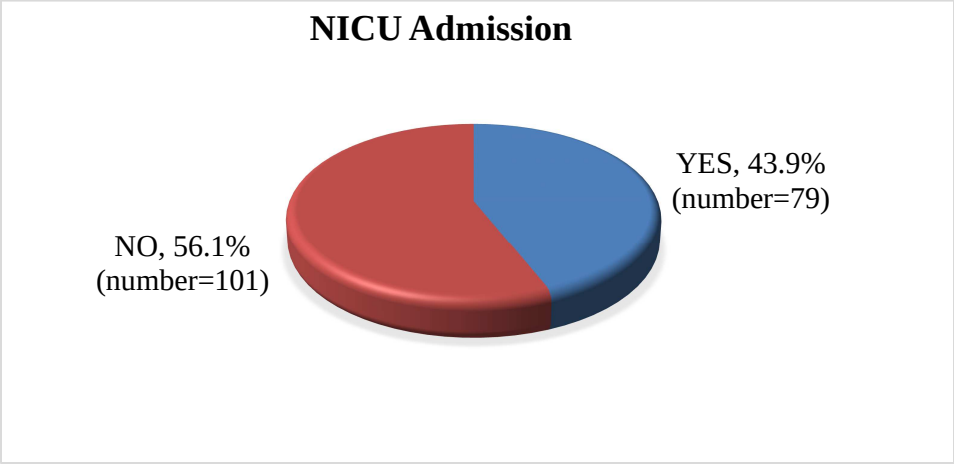
Table 15 illustrates the predictive accuracy of Umbilical Artery Pulsatility Index (PI) in predicting birth weight in cases of fetal growth restriction (FGR). In the overall study population (n=180), the specificity of umbilical artery PI (94.59%) was notably higher than its sensitivity, with a positive predictive value of 95.92%.

Comparing early and late onset FGR subgroups, both demonstrated significant specificity in umbilical artery Doppler readings, with values of 100% and 94.44%, respectively. Additionally, umbilical artery PI was observed to be more sensitive in early onset FGR compared to late onset FGR in this study.

Table 16: Descriptive analysis of NICU admission in the study population (n=180)

NICU Admission	Frequency	Percentages
Yes	79	43.89%
No	101	56.11%

Figure 19: Pie chart of NICU admission in the study population (n=180)



In table 16 and figure 19, indicate that out of the total study population, 79 infants required admission to the NICU, representing 43.89% of the cohort. Conversely, 101 infants did not require NICU admission, comprising 56.11% of the study population.

Table 17: Indication for NICU admission in the NICU population (n=79)

Indication For NICU Admission	Frequency	Percentages
Respiratory Distress	44	55.7%
Neonatal Jaundice	26	32.91%
LBW With Preterm	5	6.32%
Hypoglycaemia	2	2.53%
Abdominal Distension	1	1.27%
Poor Tone & RDS	1	1.27%

The indication of NICU admissions can be variable. Here we observe that respiratory distress was the most common indication account for 55.7% followed by neonatal jaundice, as seen in table 17.

Respiratory distress includes requirement of CPAP, oxygen requirement, transient tachypnoea of newborn.

Table 18: Descriptive analysis of duration of NICU admission (n=79)

Parameter	Mean ± SD	Median	Minimum	Maximum	95% C.I	
					Lower	Upper
Duration Of NICU Admission	5.24 ± 6.41	3.00	1.00	41.00	3.80	6.69

The mean duration of NICU admission was 5.24 days, as noticed in table 18.

Table 19: Analysis of neonatal outcomes (n=180)

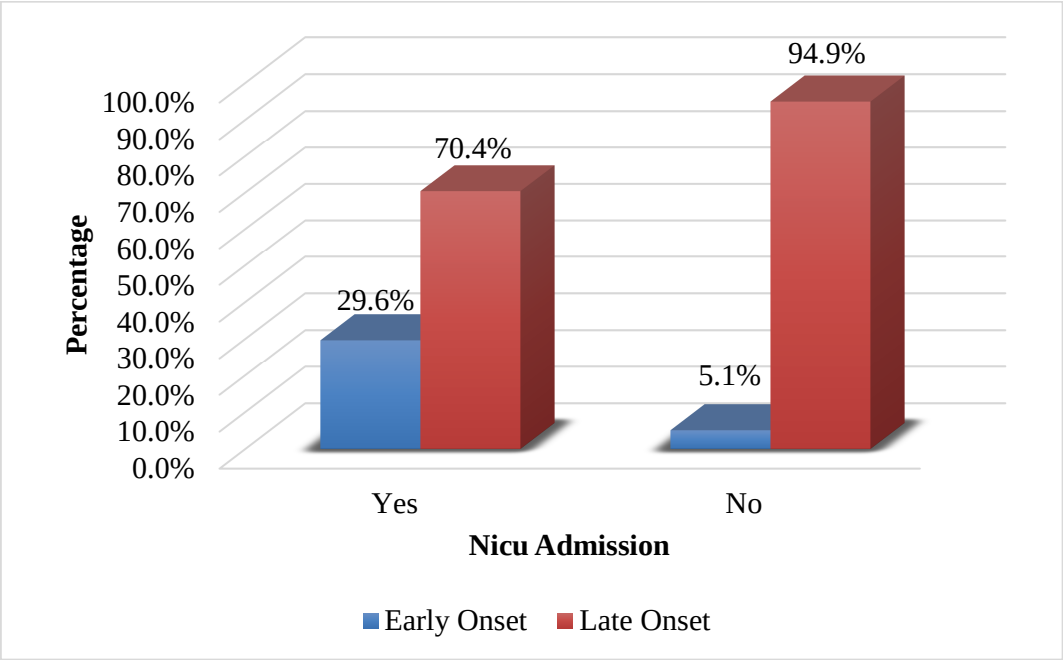
Other Complications	Frequency	Percentages
KMC	73	40.56%
Early neonatal death	8	4.44%
Failure Of Gaining Weight	1	0.56%
Nil	98	54.44%

Perinatal Mortality was observed in 8 of the 180 infants. Most of the newborn were admitted to KMC in view of low birth weight measuring 40.56% of entire study population (Table 19)

Table 20: Comparison between early and late onset FGR & NICU admission (n=180)

FGR	NICU Admission		Chi square	P value
	Yes (N=81)	No (N=99)		
Early Onset	24 (29.63%)	5 (5.05%)	19.914	<0.001
Late Onset	57 (70.37%)	94 (94.95%)		

Figure 20: Cluster bar chart of comparison of early onset FGR between NICU admission (n=180)

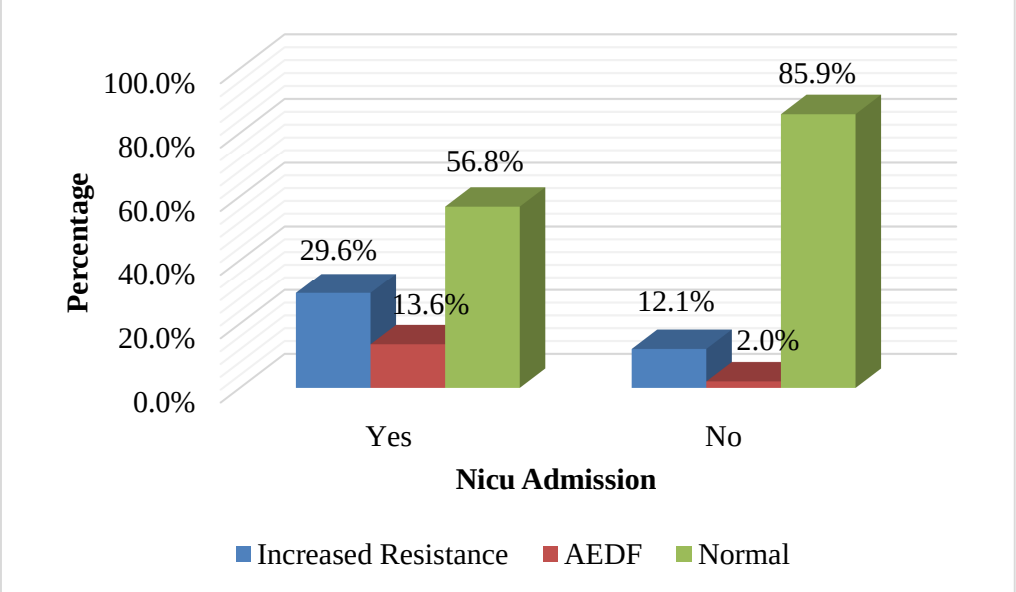


It appears that in Table 21 and Figure 20, there is a notable and statistically significant relationship between the onset of fetal growth restriction (FGR) and the requirement for admission to the NICU, with a p-value of <0.001. This suggests a strong correlation between the onset of FGR and the need for NICU care, highlighting the potential impact of FGR on neonatal health outcomes

Table 21: Comparison of umbilical artery PI with NICU admission (n=180)

Umbilical Artery Pi	NICU Admission		Chi square	P value
	Yes (N=81)	No (N=99)		
Increased Resistance	24 (29.63%)	12 (12.12%)	20.244	<0.001
AEDF	11 (13.58%)	2 (2.02%)		
Normal	46 (56.79%)	85 (85.86%)		

Figure 21: Cluster bar chart of comparison of umbilical artery PI between NICU admission (n=180)



In this study, umbilical artery pulsatility index (PI) serves as a predictor for the necessity of NICU admission. Specifically, abnormal umbilical artery (UA) findings, including increased resistance and absent end-diastolic flow (AEDF), were

significantly linked to the requirement for NICU admission, as indicated by a p-value of < 0.001 in Table 22 and Figure 21.

This underscores the clinical relevance of UA Doppler assessment in identifying fetuses at risk of requiring NICU care due to potential complications related to blood flow abnormalities.

Table 22: Comparison of Umbilical Artery PI with adverse perinatal outcomes (n=180)

Umbilical Artery PI	**NICU Admission**		**Chi square**	**P value**
	Yes (N=81)	**No (N=99)**		
Overall (N=180)				
Abnormal	35 (43.21%)	14 (14.14%)	19.001	<0.001
Normal	46 (56.79%)	85 (85.86%)		
Early Onset FGR (N=29)				
	Yes (N=22)	**No (N=7)**		
Abnormal	15 (62.5%)	3 (60%)	0.011	1.00
Normal	9 (37.5%)	2 (40%)		
Late Onset FGR (N=151)				
Abnormal	20 (35.09%)	11(11.7%)	11.894	<0.001
Normal	37 (64.91%)	83(88.3%)		

The table no 23 presents data on umbilical artery pulsatility index (PI) and its association with NICU admission, categorized by overall cases and by early onset fetal growth restriction (FGR) and late onset FGR.

In the overall cohort of 180 cases, abnormalities in umbilical artery PI were significantly more frequent among infants who were admitted to the NICU (43.21%) compared to those who were not admitted (14.14%). This difference was statistically significant with a chi-square value of 19.001 and a p-value of < 0.001, indicating a strong association between abnormal umbilical artery PI and NICU admission. (Table 23 , Figure 23)

Figure 22: Cluster bar chart of comparison of umbilical artery PI with NICU admission (n=180)

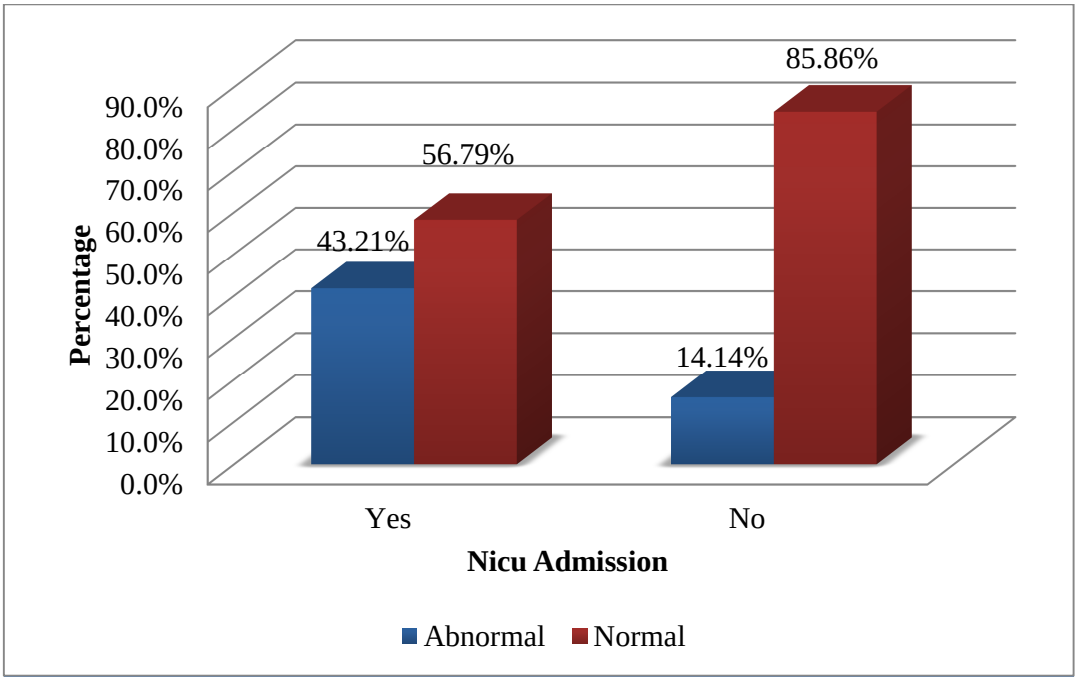
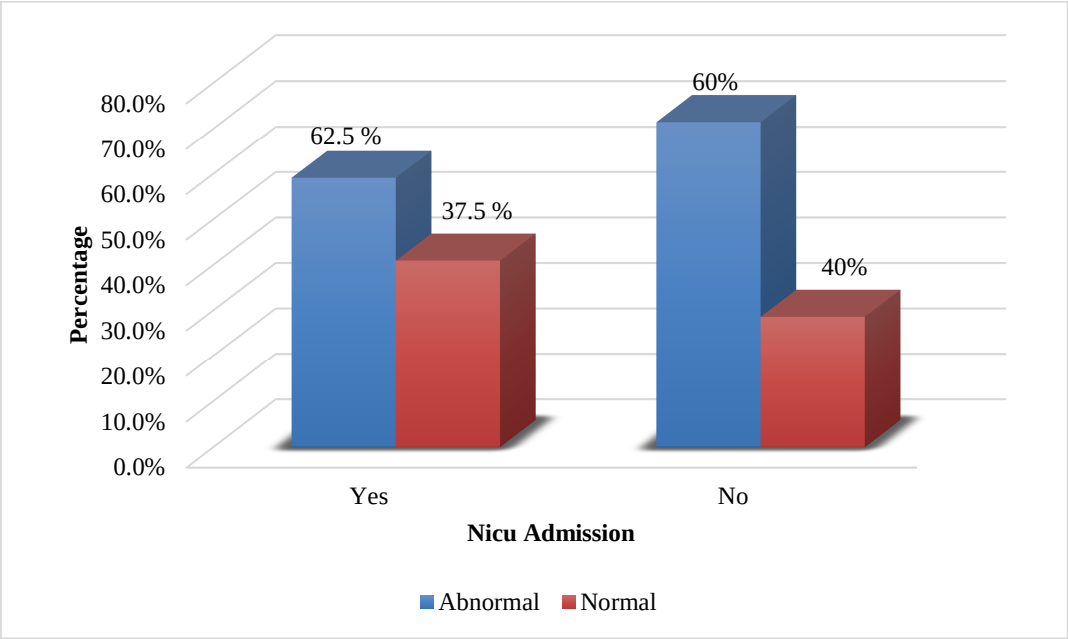
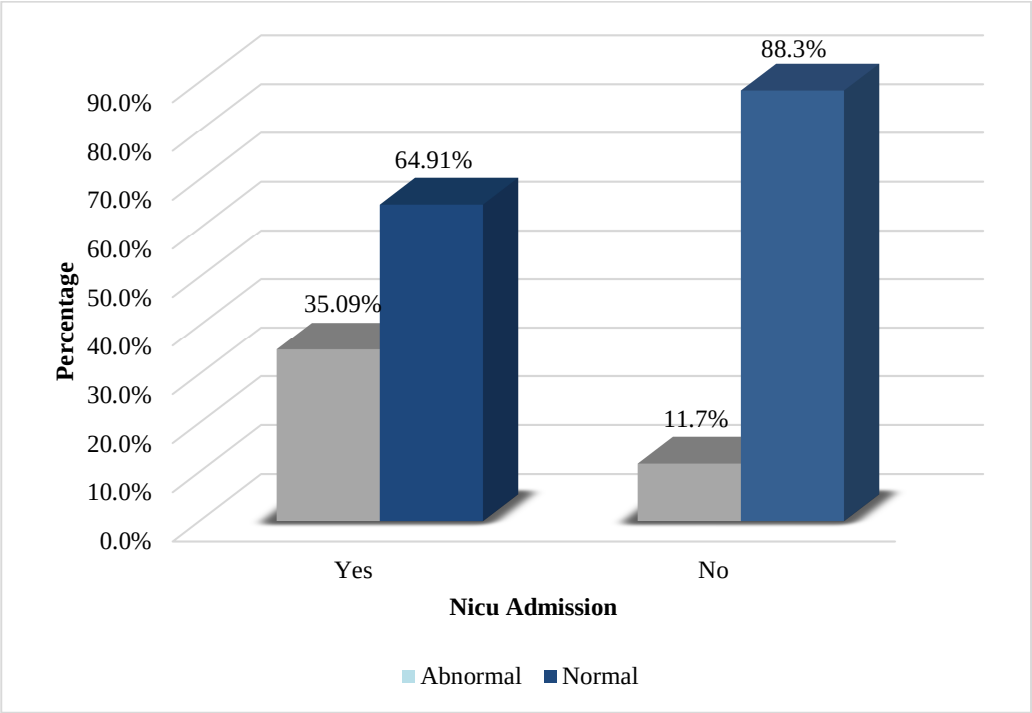


Figure 23: Cluster bar chart of comparison of umbilical artery PI between NICU admission In Early onset FGR population (n=29)



When examining early onset FGR (29 cases), which refers to cases where growth restriction is noted earlier in pregnancy, there was no significant association between umbilical artery PI abnormalities and NICU admission (p-value = 1). Both those admitted and not admitted to the NICU showed similar proportions of abnormal umbilical artery PI. (Table 23, figure 24)

Figure 24: Cluster bar chart of comparison of umbilical artery PI between NICU admission Late onset FGR population (n=151)



Conversely, in late onset FGR (another 29 cases), umbilical artery PI abnormalities were significantly more common among infants admitted to the NICU (35.09%) compared to those not admitted (11.7%). This finding was statistically significant with a chi-square value of 11.894 and a p-value of < 0.001. (Table 23, figure 25)

Table 23: Descriptive analysis of APGAR 1 and APGAR 5 min in AEDF population (n=13)

Parameter	Mean ± SD	Median	Minimum	Maximum	95% C.I	
					Lower	Upper
Apgar 1 Min	5 ± 2.31	6.0	0.0	7.0	3.6	6.4
Apgar 5 Min	6.15 ± 2.82	7.0	0.0	8.0	4.5	7.9

In the AEDF population, The mean APGAR scores were lower than the rest of the study population, as noted in table 23

Table 24: Indication for NICU admission in the AEDF population (n=9)

Indication For NICU Admission	Frequency	Percentages
Respiratory Distress	6	66.67%
Extremely LBW With Preterm	2	22.22%
Neonatal Jaundice	1	11.11%

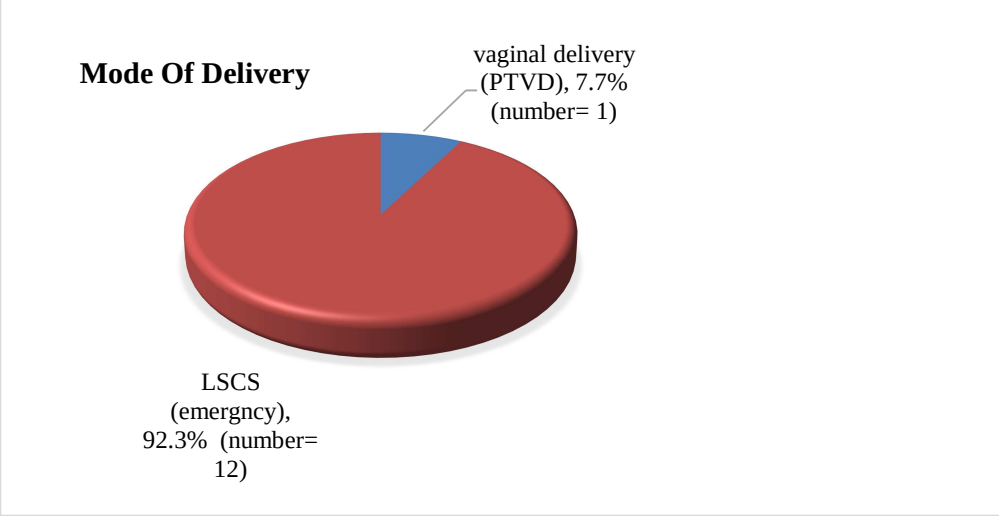
In table 24, we observed that respiratory distress was noted in 2/3rd of the patients in AEDF.

Table 25: Condition on discharge in AEDF population (n=13)

Condition On Discharge	Frequency	Percentages
Alive & Healthy	9	69.23%
Died	4	30.77%

In table 25, we observed that 9 out of 13 were discharged alive and healthy. Significant perinatal mortality & morbidity noted in study population with AEDF.

Figure 25: Pie chart for mode of delivery in the AEDF population (n=13)



The majority(92.3%) of cases in the AEDF population were born via emergency caesarean section (LSCS), with AEDF identified as the primary reason for caesarean delivery in 12 out of 13 cases included in the study (refer to and Figure 26).

Table 26: Predictive validity of Umbilical Artery PI in predicting adverse perinatal outcome (n=180)

Parameter	Value	95% CI	
		Lower	Upper
Overall (n=180)			
Sensitivity	43.21%	32.24%	54.69%
Specificity	85.86%	77.41%	92.05%
False positive rate	14.14%	7.95%	22.59%
False negative rate	56.79%	45.31%	67.76%
Positive predictive value	71.43%	56.74%	83.42%
Negative predictive value	64.89%	56.06%	73.02%
Diagnostic accuracy	66.67%	59.27%	73.50%
Early Onset FGR (n=29)			
Sensitivity	62.50%	40.59%	81.20%
Specificity	40.00%	5.27%	85.34%
False positive rate	60.00%	14.66%	94.73%
False negative rate	37.50%	18.80%	59.41%
Positive predictive value	83.33%	58.58%	96.42%
Negative predictive value	18.18%	2.28%	51.78%
Diagnostic accuracy	58.62%	38.94%	76.48%
Late Onset FGR (n=151)			
Sensitivity	35.09%	22.91%	48.87%
Specificity	88.30%	80.03%	94.01%
False positive rate	11.70%	5.99%	19.97%
False negative rate	64.91%	51.13%	77.09%
Positive predictive value	64.52%	45.37%	80.77%
Negative predictive value	69.17%	60.09%	77.27%
Diagnostic accuracy	68.21%	60.15%	75.54%

- We noted in table 26 in all study population, that the sensitivity of UA PI for predicting adverse perinatal outcome was 43.21% in FGR while specificity was higher with 85.86% with a PPV & NPV 71.43% & 64.89% accordingly. The diagnostic accuracy for predicting adverse perinatal outcome was 66.67%.
- For early onset FGR cases (n=29), umbilical artery PI showed a higher sensitivity of 62.50% but lower specificity of 40%. The PPV was 83.33% with a diagnostic accuracy of 58.62%.
- In late onset FGR cases (n=151), the sensitivity of umbilical artery PI was 35.09%, with a specificity of 88.30%. The PPV and NPV were 64.52% and 69.17%, respectively, with a diagnostic accuracy of 68.21%.
- These findings indicate that while umbilical artery PI shows varying predictive performance across different subsets of FGR and overall NICU admission, it generally exhibits higher specificity and PPV in cases of late onset FGR compared to early onset FGR.

DISCUSSION

Intrauterine growth restriction, often known as IUGR, is a frequent obstetric syndrome that is linked to an increased risk of stillbirth as well as postnatal morbidity and mortality.[68,69]The current practice guidelines for foetal surveillance and optimal delivery timing among pregnancies that are affected by intrauterine growth restriction (IUGR) centre on whether the umbilical artery Doppler pulsatility index is normal (95%), increased (>95%), or has absent or reversed end-diastolic blood flow. This is due to the fact that pregnancies with IUGR that have an abnormal umbilical artery pulsatility index (UA PI) are associated with a higher risk of adverse perinatal outcomes. [70-73]

In contrast, the risk of unfavourable perinatal outcomes appears to be comparable to those of regularly growing foetuses up until 39 weeks of gestation in cases of intrauterine growth restriction (IUGR) pregnancies while the UA PI is normal. [74,75] Early-term delivery is therefore suggested for intrauterine growth restriction (IUGR) pregnancies that have an increased UA Doppler PI, whereas term delivery is an option for IUGR pregnancies that have normal Doppler indices at the time of delivery.[68-69]

DEMOGRAPHIC VARIABLES OF THE POPULATION (TABLE NO 1)

In the present study, the mean age of the study participants was 25.38 years, while the BMI was 24.95 kg/m2. Majority of the study population presented in the third trimester, with the mean gestational age at birth being 37.42 weeks

In a study by Lewkowitz, A. et al, 87.4% of the population belonged to the ages of 18-34 years, like the findings of our studies. 55.2% of the study participants had a normal BMI which is similar to our study . [74]

In a study by Sam Mathewlynn et al, the mean age in those with abnormal UA PI was 30 (26–34) years, while in 32 (28–36) years in those with previously normal UA PI and no evidence of FGR.(p<.001). The mean BMI in both study groups was 24.36 (20.26–28.47) and 24.80 (20.85–28.75) (p value <.448), which was lower than the findings of our study. [75]

In a study by Gudmundsson et al, the median maternal age was 28 years (range 18–39) and mean body mass index 23.5 (±3.1 SD) kg/m2. [76]

EARLY & LATE ONSET FGR IN STUDY POPULATION (TABLE NO 2)

In current study among entire study population 83.89% (151 cases) were late onset FGR while only 16.11 % (29 cases) were early onset FGR .

In a study done by Srirambhatla A, Mittal S et al among 80 study population 36 cases were early onset FGR while 44 cases were late onset FGR . [51]

HIGH RISK FACTORS (TABLE NO 3)

In our study, we found a statistically significant difference between subgroups of FGR in relation to gestational hypertension and preeclampsia. Among those with early-onset fetal growth restriction (FGR), 27.59% experienced gestational hypertension and 31.03% developed preeclampsia. In contrast, in the late-onset FGR group, the rates of gestational hypertension and preeclampsia were 11.26% and 7.95%, respectively. We also observed cases of hypothyroidism (9 patients), placental abruption (4 cases), gestational diabetes mellitus (3 cases), chronic hypertension (4 cases), and chronic hypertension with superimposed preeclampsia (2 cases) in our study population

In Bhargavi Rangarajan's study, the most prevalent medical comorbidity was hypothyroidism. Hypothyroidism was followed by pregnancy-related hypertension affecting 4% of the participants, diabetes complicating pregnancy in 4.3%, autoimmune and heart diseases complicating pregnancy in 3%, and infertility treatment history in 1.9%. Regarding obstetric comorbidities, gestational hypertension and the preeclampsia spectrum were identified as the leading causes of FGR, affecting 5.3% and 5.6% of cases, respectively. In the study population, 3% had a history of gestational hypertension, while 3.7% had a history of thyroid disease, and 2.4% had a history of gestational diabetes mellitus (GDM). [77]

In a study conducted by Chirtrarasan P. et al., 67 individuals (33.5%) were identified with pregnancy-induced hypertension as a risk factor. Gestational diabetes was noted as the risk factor in 5 cases (2.5%), while 6 cases (3%) involved heart disease complicating pregnancy. Additionally, 48 cases (24%) were associated with other risk factors such as breech presentation, post-term pregnancy, bronchial asthma, anemia, hypothyroidism, or chronic hepatitis. Interestingly, 102 patients (54%) did not exhibit any identifiable risk factors in the study. [71]

PARITY (FIGURE NO 1)

In our study 54.44% were Primigravida, while the remaining were multigravida

In a study by Muniz CS, Dias BF, 51.4% of the mothers were nulliparous which is similar to our study. [64]

In another study done by Dall'Asta A ,70.1% study population were nulliparous. [66]

MODE OF DELIVERY & GESTATIONAL AGE AT DELIVERY (TABLE NO 7, 11)

In our study, majority (72.2%) of the patients underwent emergency LSCS. The most common cause for the LSCS was fetal distress followed by previous LSCS. Other frequent indications were AEDF, oligohydromnios, anamnios.

In a study by Sam Mathewlynn, et al, 12 (5.9) patients in the abnormal UA group and 390 (4.9) patients in the previously normal UA group underwent pre-labour CS, while 23 (11.4) and 858 (10.8) underwent an emergency LSCS. This was much lower than the findings in our study. [75]

In a study by Bhargavi Rangarajan, Approximately 53.5% of deliveries involved emergency cesarean sections. The primary reasons for these procedures included non-reassuring fetal heart rate, fetal distress, previous cesarean section, meconium-stained amniotic fluid, and failed induction. [77]

In a study done by Coenen H, Braun J there was a significant disparity observed in cesarean section rates between the FGR and SGA groups, with a higher incidence in the FGR group (79.5% vs. 45.4%; $p < 0.001$). Additionally, there were fewer instances of spontaneous vaginal deliveries in the FGR group compared to the SGA group (18.0% vs. 50.6%; $p < 0.001$). [67]

In present study the mean gestational age at delivery for all the study population was 37.42 weeks. The mean age at delivery for early & late onset FGR were 34.57 weeks & 37.97 weeks respectively .The difference in gestational age between early and late onset FGR was statistically significant ($P< 0.001$), indicating that infants with late onset FGR were born at a more gestational age compared to those with early onset FGR .

UMBILICAL ARTERY PI DOPPLER (FIGURE NO 2,3 & TABLE NO 5)

In the present study, to confirm the diagnosis, in this study, we propose that Umbilical artery PI can predict the possible poor neonatal outcomes. In this study, we find that 20% had increased resistance, while 7.22 % had AEDF.

In a study by Srirambhatla A, Mittal S et al, 36 (45%) were classified as early onset FGR, while 44 (55%) were categorized as late-onset FGR. Abnormal umbilical artery pulsatility index (UA PI) was found in 20 cases (55.55%) within the EFGR group, indicating a higher prevalence of abnormal UA PI compared to the LFGR group, where 15 cases (34.09%) exhibited abnormal UA PI. [51]

In current study Early onset FGR cases had a higher percentage (62.07%) of abnormal umbilical artery Doppler findings compared to late onset FGR cases (17.22%). Specifically, increased resistance was more common in both early onset (34.48%) and late onset (17.22%) FGR cases, but relatively more prevalent in early onset cases. AEDF was also observed more frequently in early onset FGR cases (27.59% vs. 3.31% in late onset). Statistical analysis revealed a significant difference in umbilical artery pulsatility index (PI) between early and late onset fetal growth restriction (FGR) groups, with a p-value of less than <0.001.

In a study by Sam Mathewlynn, et al, Group 1 pregnancies did not have a substantially higher likelihood of undergoing a second scan; however, they did have significantly higher frequencies of small for gestational age (SGA) (OR 6.76, CI 4.23–10.80), severe SGA (OR 13.32, CI 6.59–26.91), and foetal growth restriction (OR 9.85, CI 6.27–15.49) according to the ISUOG Delphi consensus definition—Citation20. Doppler velocimetry was repeated in some cases without foetal biometry. Among the 4606 cases, which accounted for 56.5% of the total, that continued beyond

34 + 0 and had both UA and MCA Doppler measurements repeated, the UA PI was significantly more likely to be greater than the 95th centile (odds ratio: 18.79, confidence interval: 11.51–30.66), and the CPR was more likely to be less than the fifth centile (odds ratio: 5.07, confidence interval: 3.37–7.63). [75]

In a study by Lewkowitz et al, elevated Doppler UA PI for 25-49% of recorded measurements; 13 women (0.9%) had elevated UA PI for 50-74% of all recorded measurements, and none of the women had elevated PI for 75-99% of all recorded measurements. The last recorded UA PI was elevated for 37 women (25.9%) with intermittently elevated UA PI. Sensitivity analyses suggested that women with IUGR pregnancies and UA PI elevation in 50-74% of recorded UA PI measurements had lower 5-minute Apgar scores compared with women with IUGR pregnancies and normal UA PI (P<009), but there was no difference in neonatal morbidity or umbilical artery pH between the 2 groups. Otherwise, neonatal morbidity or obstetric outcomes were similar when compared between the group of women with persistently normal UA PI and the various subgroups of women with elevated UA PI, regardless of the proportion of elevated UA PI measurements or whether the last UA PI was elevated or normal. [74]

MODE OF DELIVERY WITH UA PI (TABLE NO 5,6 AND FIGURENO 4,5)

In the present study, there was no significant association between mode of delivery and the umbilical artery PI. Cases of AEDF also demonstrate a significantly increased inclination towards LSCS (92.31% compared to vaginal delivery (7.69%) as depicted in Table 6 and Figure 5. In Lewkowitz et al, 16 (11.2) and 33 (7.7) in both groups had emergency LSCS, and the latter was the group with an abnormal UA PI [7]. However, similar to our study, there was no difference between the groups. [74]

BIRTH WEIGHT (TABLE NO 12 &15)

In the present study the mean birth weight for entire study population was 2.17 ± 0.44 (table no 9) . In total study population 79.44% had low birth weight (<2500gm) & in low birth weight population most of the birth weight were in between 1.5 to 2.5kg. 2.2% study population fell into extremely low birth weight category & 7.78% were very low birth weight category.

A study done by Bhargavi Rangarajan et alout of the total births, 46.9% had a birth weight greater than 2.5 kg. A small percentage1.9%, fell into the extremely low birth weight category, while 8.7% were classified as very low birth weight. The majority, comprising 53.7%, fell into the low birth weight category. [77]

In a study done by Coenen H, Braun J et al the median birth weight in pregnancies affected by fetal growth restriction (FGR) was significantly lower (1780 g [1230, 2290] compared to 2565 g [2278, 2805]; $p < 0.001$), which aligns with the finding of a lower median gestational age at delivery in the FGR group. [67]

In the study by Lewkowitz, 59% were males, and the mean birthweight was 2.4 kg. this variation is due to the regional and ethnic variations. The mean 5-minute APGAR was 9, which is similar to the findings in the present study. [74]

In our study, the umbilical artery pulsatility index (UA PI) demonstrated a sensitivity of 64.29% in predicting low birth weight (LBW), while it exhibited a specificity of 100% for identifying early-onset fetal growth restriction (EFGR) patients. For cases specifically involving late-onset fetal growth restriction (LFGR) and predicting LBW, the UA PI showed a sensitivity of 25.22% and a specificity of 94.44%, aligning with our study's findings. Across the entire study population, the UA PI had a sensitivity of 32.87% and a specificity of 94.59% for predicting LBW.

In the study population of Srirambatla et al , UA PI had a sensitivity of 62% when it came to predicting LBW, while it had a specificity of 100% when it came to EFGR patients. When it came to predicting low birth weight in cases with LFGR, the UA PI had a sensitivity of 46%, which was corroborating with the findings of our study. [51]

APGAR SCORE (TABLE 9, 10 AND FIGURE 11, 12)

In our current study, across the entire study population, the average APGAR scores at 1 minute and 5 minutes were 6.83 and 8.04, respectively. Early-onset fetal growth restriction (FGR) was notably linked with a higher incidence (75.9%) of low APGAR scores at 1 minute compared to late-onset FGR, where only 17.9% showed abnormal APGAR scores. Infants affected by early-onset FGR exhibited significantly higher rates of lower APGAR scores at both 1 minute and 5 minutes compared to those with late-onset FGR (both $P < 0.001$).

In a study conducted by Srirambatla et al., 38 out of 80 neonates had a one-minute Apgar score < 7. [51]

In Bhargavi Rangarajan et al.'s study, 8.7% of the babies, totaling 27 infants, had an APGAR score of 7 or less. All of these babies required resuscitation such as mechanical ventilation or continuous positive airway pressure (CPAP), indicating an overall poor prognosis. [77]

CORRELATION OF UMBILICAL ARTERY PI WITH NICU ADMISSION AND ADVERSE PERINATAL OUTCOMES (TABLE NO 5, 10, 17, 19 , 25 & 26 FIGURE 25)

In the present study, there is a significant association between onset of FGR and NICU admission. Additionally, Umbilical artery PI can determine the need for NICU admission. The abnormal UA was associated significantly with need for NICU admission. We observed a total of 36 cases with increased resistance and 13 cases with absent end-diastolic flow (AEDF). Among those with early-onset fetal growth restriction (FGR), 34.48% of the study population exhibited increased resistance on Doppler ultrasound, and 27.59% had AEDF. In contrast, in the late-onset FGR group, the frequencies of increased resistance and AEDF were lower, at 17.22% and 3.31%, respectively.

There is a difference in the severity of Doppler alterations and the temporal relationship between them in early-onset and late-onset FGR.

In the study conducted by Novac et al (25) on 126 pregnant women with an estimated birth weight (EFBW) of less than 10% of their gestational age, it was found that the incidence of umbilical and MCA Doppler anomalies was higher in EFGR compared to LFGR. On the other hand, UA abnormalities may be more mild in LFGR (18, 23, and 24), despite the fact that they are more severe and are encountering more frequently in EFGR. It has been observed that EFGR (19) is associated with high impedance umbilical arterial flow as well as an overall reduction in foetal growth.

Twenty of the thirty-six instances of EFGR included in the study according to Srirambatla et al. exhibited an abnormal UA PI, and seventeen of those cases had unfavourable outcomes for the foetus. For the purpose of predicting unfavourable

outcomes and low birth weight in EFGR, the UA PI was the metric that was the most sensitive, specific, and accurate. A total of seven fetal deaths were observed in their study, among which two (28%) showed absent end-diastolic flow and two (28%) reversal of diastolic flow. [51]

Among the 80 instances that were investigated by Srirambatla et al., 47 foetuses were found to have a low birth weight. Of these, 32 were from the EFGR group and 15 were from the LFGR group. LBW was present in every single foetus who had an abnormal UA PI in the EFGR group. LBW was present in seventeen of the twenty-one instances with abnormal MCA PI and in twenty-one of the twenty-one cases with abnormal CPR. [51]

In present study 79 cases required admission to NICU for various reasons. The most common indication for NICU admission was respiratory distress, observed in 43 cases, accounting for 54.43% of the total NICU admissions. Following this, neonatal jaundice was noted in 26 cases, comprising 32.9% of the admissions. Other indications for NICU admission included low birth weight (LBW), hypoglycemia, and poor tone.

In our study 40.56% (73 cases) subjects among all study population were admitted to KMC due to low birth weight.

In Srirambatla et al.'s study, adverse outcomes were observed in 39 newborns, which accounted for 48.8% of the total. These outcomes included eight cases of hypoxia, six cases of seizures, 20 cases of neonatal sepsis, and 18 cases of other conditions such as respiratory distress and necrotizing enterocolitis. Several of these infants experienced more than one adverse outcome concurrently. [51]

In our study that the sensitivity of UA PI for predicting adverse perinatal outcome was 43.21% in FGR while specificity was higher with 85.86% with a PPV & NPV 71.43% & 64.89% accordingly. The diagnostic accuracy for predicting adverse perinatal outcome was 66.67%.(Table no 26)

In the study population of Srirambatla et al, reversal of end-diastolic flow was seen in five cases and absent end-diastolic flow (AEDF) in eight cases. They also observed in their study population that absent/reversal of EDF was associated with low five-minute APGAR scores in eight (61%) out of 13 cases and NICU admissions in 12 (92%) cases. [51]

In our study, we identified 13 cases of absent end-diastolic flow (AEDF). Among these cases, 12 underwent emergency caesarean section (Figure 26). One patient with AEDF underwent vaginal delivery as didn't give consent for caesarean section (prognosis was guarded with EFW 690 gm) .There were two fresh stillbirths observed in the study population, and both cases were associated with AEDF. Among two fresh still birth one case (birth weight 870 gm) was associated with abruptio placenta & for another baby (birth weight 700 gm) with guarded fetal prognosis . Among the 11 live births with AEDF, Nine of the babies required admission to the neonatal intensive care unit (NICU) due to respiratory distress syndrome (RDS), continuous positive airway pressure (CPAP) requirement, or extremely low birth weight. However, two study population with AEDF had early neonatal death due to neonatal sepsis (birth weight 1.04 kg) and RDS (birth weight 600gm) during the perinatal period.

CONCLUSION

Umbilical artery PI is an important parameter for evaluation of growth restricted fetus Adverse perinatal outcomes are often correlated with abnormal pulsatility index (PI) values in fetal umbilical artery. The sensitivity of umbilical artery pulsatility index (UA PI) for predicting adverse perinatal outcomes in cases of fetal growth restriction (FGR) was 43.21%. This means UA PI correctly identified about 43.21% of cases that actually experienced adverse perinatal outcomes.

On the other hand, the specificity of UA PI was higher at 85.86% in FGR cases. This indicates UA PI accurately ruled out approximately 85.86% of cases that did not experience adverse perinatal outcomes. Umbilical artery PI was more sensitive (62.5%) in EFGR compared to LFGR whereas it was most specific (88.3%) in LFGR cases for predicting adverse perinatal outcome.

The positive predictive value (PPV) was 71.43%, indicating the probability that a positive UA PI result correctly predicted an adverse perinatal outcome. The negative predictive value (NPV) was 64.89%, indicating the probability that a negative UA PI result correctly ruled out an adverse perinatal outcome.

Overall, the diagnostic accuracy of UA PI for predicting adverse perinatal outcomes in FGR cases was 66.67%. This represents the proportion of correct predictions made by UA PI out of all cases evaluated.

Abnormal umbilical artery PI is found to be associated with low birth weight, increased rate of caesarean section and also associated with increased perinatal morbidity and mortality.

SUMMARY

- In our observational study, the 180 participants had a mean age of 25.3 years. Of all subject 54.44% were primigravida and 45.56% were multigravida.
- In the study population, the prevalence of early-onset fetal growth restriction (FGR) was 16.11%, while late-onset FGR accounted for 83.89%.
- Increased resistance on UA doppler & AEDF found in 20% and 7.22% cases accordingly. Meanwhile normal UA doppler found in 72.78% cases.
- The majority of cases in the study were delivered by LSCS, accounting for 72.22% of the total study population. Among these LSCS deliveries, the majority were emergency procedures, comprising 64.44% of the total LSCS cases.
- There were no statistical significant noted between UA PI and mode of delivery.
- In total study population 2 FSB noted both were associated with AEDF, rest of them delivered alive baby.
- Out of the 180 study subjects, 123 delivered term babies, accounting for 68.3% of the total. These term babies had a mean gestational age of 37.4 weeks.
- Mean birth weight of study population was 2.17 kg. Additionally, 143 cases were associated with low birth weight (LBW) neonates. abnormalities in umbilical artery PI (including increased resistance and AEDF) are significantly associated with low birth weight (P = <0.001)
- In the overall study population (n=180), the specificity of umbilical artery PI (94.59%) was notably higher than its sensitivity for predicting birth weight , with a positive predictive value of 95.92%.

- Comparing early and late onset FGR subgroups, both demonstrated significant specificity in umbilical artery Doppler readings, with values of 100% and 94.44%, respectively.
- 49 cases had 1min APGAR score of <7.
- Out of the 180 cases in the study, 79 cases required admission to NICU for various reasons. The most common indication for NICU admission was respiratory distress, observed in 43 cases, accounting for 54.43% of the total NICU admissions. Following this, neonatal jaundice was noted in 26 cases, comprising 32.9% of the admissions. Other indications for NICU admission included low birth weight (LBW), hypoglycemia, and poor tone.
- Eight perinatal death noted in study population. 172 babies were discharged on healthy condition.
- AEDF population group were more commonly associated with adverse perinatal outcome including two FSB. Out of 13 AEDF cases, 12 cases underwent LSCS.
- There is a significant statistical relation noted between umbilical artery PI and adverse perinatal outcome with a P value of <0.001.
- Thesensitivity of UA PI for predicting adverse perinatal outcome was 43.21% in FGR while specificity was higher with 85.86% . the diagnostic accuracy was 66.67%.
- Umbilical artery PI shows varying predictive performance across different subsets of FGR and overall NICU admission, it generally exhibits higher specificity and PPV in cases of late onset FGR compared to early onset FGR.

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ANEXURE: I – INFORMED CONSENT FORM

"TO STUDY THE ROLE OF UMBILICAL ARTERY PULSATILITY INDEX (PI) AS A PREDICTOR OF PERINATAL OUTCOME IN GROWTH RESTRICTED FETUS"

Principle Investigator:

Dr.

Post Graduate Student

Dept of Obstetrics and Gynaecology

J. N. Medical College, Belagavi-10.

Co-Investigator:

Dr.

Professor

Dept of Obstetrics and Gynaecology,

J.N. Medical College, Belagavi-10.

Objective: To study the efficacy of pulsatility index of umbilical artery doppler in prediction of adverse perinatal outcomes in fetuses diagnosed as FGR.

Introduction: As per the recent research, Fetal growth restriction (FGR) is a commonly encountered complication in pregnancy, which has been associated with increased perinatal morbidity and mortality. Doppler ultrasound aids in early detection of fetal compromise and is used for deciding the time and mode of delivery. Abnormalities in Doppler can help predict adverse perinatal outcomes.

Explanation of procedure: A detailed history with physical examination is taken. Ultrasonographic (USG) diagnosis of FGR is done. (EFW or AC <10%). Umbilical Artery pulsatility index is measured within 7 days before delivery. Patients are followed upto delivery & Neonate are followed upto 7 days after delivery.

Withdrawal from participation in the study: Participation in this study is voluntary. You will be free to decide whether to participate in this study or continue participation once enrolled. In case you decide to withdraw your participation, you are free to do so. However, please convey the decision to the principal investigator.

Possible benefits from participating in the study: You will/will not have nor get any benefits by participating in this study. The data gathered will help the population at large.

Possible risks from participating in the study: There are no risks involved in participating in this study.

Privacy and confidentiality: The information collected from you will be coded, to prevent any person from identifying you. Your identity will never be revealed. The data collected from you will be kept confidential and only processed or aggregated data will be used for publication.

Financial incentives: You will not receive any payment for participating in this study. **Authorization for publication of aggregated data:** Results obtained after processing of the aggregated data will be published for scientific purposes and or presented to scientific groups.

However, your identity will never be revealed.

Questions: In case of any questions with regard to this study, you are free to contact: Dr Harsha Hegde, Chairperson, Ethical committee of JNMC, 0831-2473777 Extension 4052.

Legal rights: By signing this consent form, we are not waving any of your legal rights.

CONSENT STATEMENT

I am making a voluntary decision to participate in the study – "**To Study The Role Of Umbilical Artery Pulsatility Index (PI) As A Predictor Of Perinatal Outcome In Growth Restricted Fetus**"**.** My signature below indicates that I have decided to participate and I have read the information provided above or the information provided ove has been read to me in the language that I understand best. I was given the opportunity to ask questions and that they have been answered to my satisfaction.

Name of the participant:

Signature or left thumb impression of the participant:

Name of the witness:

Signature or left thumb impression of the witness:

Name of the investigator:

Signature of the investigator:

ANNEXURE: II - PROFORMA

FIRST NAME: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

LAST NAME ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

AGE: ☐☐

IP NO: ☐☐☐☐☐☐☐☐

Date of admission: ☐☐☐☐☐☐☐☐

Date of Delivery: ☐☐☐☐☐☐☐☐

Date of Discharge: ☐☐☐☐☐☐☐☐

Occupation:☐☐☐☐☐☐☐☐

Address: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Phone number: ☐☐☐☐☐☐☐☐☐☐

Socio-economic status : ☐☐☐☐☐☐☐☐

As per Modified B.G. Prasad Classification

Social class	Per capita income
Class 1	>/=8349
Class 2	4174- 8348
Class 3	2505-4173
Class 4	1252-2504
Class 5	</= 1251

Education:

OBSTETRIC HISTORY:

Married life: ☐☐

Score : ☐☐☐☐☐☐☐☐

MENSTRUAL HISTORY:

Menarche-

M.C-

LMP (DD/MM/YY):☐☐☐☐☐☐☐☐ EDD: ☐☐☐☐☐☐☐☐

C.EDD:☐☐☐☐☐☐☐☐

Period of Gestation: ☐☐☐☐☐☐☐☐☐☐

Past History: 1= YES, 2=NO

H/O Chronic Hypertension : ☐

H/O Diabetes mellitus : ☐

H/O Renal disease: ☐

H/O Heart Disease: ☐

H/O Epilepsy: ☐

H/O Tuberculosis: ☐

Family H/O-

Twin pregnancy: ☐

PIH: ☐

Personal history- Smoking: ☐

Consumption of alcohol: ☐

Drug Abuse: ☐

Any High Hisk Factor :

GENERAL PHYSICAL EXAMINATION:

Built::

Height: Weight:

BMI:

Pulse: Blood pressure:

Pallor

Icterus

Pedal Edema

Breast

Thyroid

SYSTEMIC EXAMINATION:

Respiratory system:

Cardiovascular examination:

Per abdomen examination-

Size of uterus-

Presentation-

FHS-

CEFW-

Obstetric ultrasound-

Dating scan (First or second Trimester scan):

First Trimester scan:

CRL	
Cardiac Activity	
Yolk Sac	
USG EDD	

Second Trimester scan:

BPD	
HC	
AC	
FL	
EFW	
AGA	
Any gross congenital anomaly	

POG according to dating scan-

GROWTH SCAN –

Presentation			
Placenta			
AFI			
BPD			
HC			
AC			
FL			
Umbilical artery PI			
EFW			
Average GA			

DIAGNOSIS:

INVESTIGATION:

HB%-

WBC- PCV-

Platelets-

Blood Urea-

S. Creatinine-

S. Uric acid-

Urine albumin-

VDRL- HBsAg- HIV-

Blood grouping & Rh typing-

MANAGEMENT:

Date of delivery	
Mode of delivery	
Induction/Augmentation :	
Duration of Labour	
Intrapartum Complications	
Blood Loss	
Indication for LSCS	
Intra-OP findings :	

Any Placental abnormalities:

PERINATAL OUTCOME:

Condition at birth	
Term/Preterm	
Sex	
Weight	
APGAR	1 min- 5min-
NICU Admission	
Indication for NICU admission	
Condition of baby at discharge	

ANNEXURE: III

MASTER CHART

SL NO	IP NO	AGE (YRS)	DIAGNOSIS	GESTATIONAL AGE AT BIRTH	BMI	EARLY ONSET FGR	LATE ONSET FGR	AFI (CM)	AC (%)	EFW(%)	UMBILLICAL artery. PI	GESTATIOAL HTN	PE	ABRUPTIO PLACENTA	PRETERM DELIVERY	VAGINAL DELIVERY	LSCS (ELECTIVE/EMERGENCY)	INDICATION FOR LSCS	OTHER HIGH RISK FACTOR	Condition at birth	TERM	PRETERM	BIRTH WEIGHT (KG)	APGAR 1 MIN	APGAR. 5 MIN	NICU ADMISSION	INDICATION FOR NICU ADMISSION	DURATION OF NICU ADMISSION	OTHER COMPLICATIONS	CONDITION ON DISCHARGE
1	1203466	22	G2P1L0 WITH 35WKS 1 DAY POG WITH CEPHALIC	WKS 3 DA	28.9	NO	YES	11.7	8	3	1.42 (>99%)	NO	YES	NO	NO	NO	ELECTIVE	PREVIOUS LSCS	NO	ALIVE	YES	_	2.49	7	8	YES	NEONATAL JAUNDICE	1 DAY	FAILURE OF GAINING WEIGHT	ALIVE & HEALTHY
2	1205951	26	PRIMI WITH 38WKS WITH CEPLALIC	WKS 5 DA	22.7	NO	YES	8.5	8	3	0.7 (25%)	NO	NO	NO	NO	FTVD	NO	_	N0	ALIVE	YES	_	2.48	7	8	YES	NEONATAL JAUNDICE	1 DAY	NO	ALIVE & HEALTHY
3	1206386	19	G2A1 WITH 39WKS 1 DAY WITH CEPHALIC	WKS 2 DA	23.6	NO	YES	15.7	5	14	O.89(48 %)	NO	NO	NO	NO	NO	EMERGRNCY	ETAL DISTRES	N0	ALIVE	YES	_	2.6	8	9	NO	_	_	NO	ALIVE & HEALTHY
4	1204461	22	PRIMIGRAVIDA WITH 35 WKS 1 DAY WITH CEPHALIC PRESENTATION WITH PV BLEEDING WITH	WKS 6 DA	18.6	NO	YES	12.3	6	3	0.8 (25%)	NO	NO	YES	YES	NO	EMERGENCY	OLIGOHYD ROMNIOS	? SUBCHORIONIC HEMORRHAGE	ALIVE	_	34 WKS 6 DAYS	1.6	7	8	YES	RESPIRATORY DISTRESS (HYPOXIA)	3 DAYS	NEONATAL JAUNDICE	ALIVE & HEALTHY
5	1207293	31	G2P1L1 WITH 37WKS 2DAYS WITH	WKS 3 DA	17.3	NO	YES	8.8	5	8	(0.66(23 %%)	NO	NO	NO	NO	FTVD	NO	_	N0	ALIVE	YES	_	2.6	8	9	NO	_	_	NO	ALIVE & HEALTHY
6	1207297	24	PRIMI WITH 39 WKS 2 DAYSWITH CEPLALIC PRESENTATION WITH	WKS 3 DA	23.8	NO	YES	5.9	5	14	0.88(42 %)	NO	NO	NO	NO	NO	EMERGENCY	OLIGOHYD ROMNIOS	N0	ALIVE	YES	_	2.7	8	9	NO	_	_	NO	ALIVE & HEALTHY
7	1207357	28	G3P2L2 WITH 41 WKS 6 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 6 DA	24.2	NO	YES	5.9	2	6	0.89(81 %)	NO	NO	NO	NO	NO	EMERGENCY	NON PROGRESS OF LABOUR	N0	ALIVE	YES	_	2.3	8	9	NO	_	_	NO	ALIVE & HEALTHY
8	1207126	25	PRIMI WITH 39 WKS 3 DAYSWITH CEPLALIC	WKS 4 DA	23	NO	YES	3.9	4	3	1.10 (96%)	NO	NO	NO	NO	NO	EMERGENCY	OLIGOHYD ROMNIOS	N0	ALIVE	YES	_	2.2	7	8	YES	NEONATAL JAUNDICE	1 DAY	MC FOR 4 DAY	ALIVE & HEALTHY
9	1207541	24	G2P1L1 WITH 39 WKS 3 DAYS WITH BREECH PRESENTATION WITH	WKS 4 DA	23.6	NO	YES	9	25	9	0.69(27 %)	NO	NO	NO	NO	NO	ELECTIVE	BREECH PRESENTATION	N0	ALIVE	YES	_	2.7	7	8	YES	NEONATAL JAUNDICE	1 DAY	NO	ALIVE & HEALTHY
10	1207853	23	PRIMI WITH 39 WKS 6 DAYSWITH CEPLALIC	40 WKS	30.7	NO	YES	9.7	8	3	0.83(56 %)	NO	NO	NO	NO	NO	EMERGENCY	FETAL DISTRESS	N0	ALIVE	YES	_	2.6	8	9	NO	_	_	NO	ALIVE & HEALTHY
11	1207913	26	G4P2L2A1 WITH 34 WKS 6 DAYS WITH CEPHALIC	WKS 6 DA	19.4	NO	YES	19.2	8	25	1.25(96 %)	YES	NO	YES	YES	NO	EMERGENCY	FETAL DISTRESS	N0	ALIVE	_	34 WKS 6 DAYS	1.3	5	6	YES	RESPIRATORY DISTRESS (HYPOXIA)	6 DAYS	DIED AT PND 3	DIED
12	1208293	26	G2A1 WITH 37 WKS 4 DAY WITH CEPHALIC PRESENTATION WITH LATE ONSET FGR	WKS 6 DA	24.6	NO	YES	10.5	10	3	1.09 (85%)	NO	NO	NO	NO	NO	EMERGENCY	DEEP TRANSEVERSE ARREST	N0	ALIVE	YES	_	2.7	7	8	YES	NEONATAL JAUNDICE	1 DAY	NO	ALIVE & HEALTHY
13	1208192	20	PRIMI WITH 37 WKS 1 DAY WITH CEPHALIC PRESENTATION WITH	WKS 3 DA	24.6	NO	YES	4.8	2	2	1.44 (99%)	NO	NO	NO	NO	NO	EMERGENCY	OLIGOHYD ROMNIOS	N0	ALIVE	YES	_	2	8	9	YES	NEONATAL JAUNDICE	1 DAY	NO	ALIVE & HEALTHY
14	1209105	25	PRIMI WITH 42 WKS 2 DAYS WITH BREECH PRESENTATION WITH	WKS 2 DA	23.1	NO	YES	5.3	6	33	0.8(52%)	NO	NO	NO	NO	NO	EMERGENCY	BREECH PRESENTATION	N0	ALIVE	YES	_	2.6	7	9	NO	_	_	NO	ALIVE & HEALTHY
15	1209103	20	PRIMI WITH 40WKS 2 DAYS WITH CEPHALIC	WKS 2 DA	25.9	NO	YES	8	2	2	1.2(98%)	NO	NO	NO	NO	FTVD	NO	_	N0	ALIVE	YES	_	2.6	7	9	NO	_	_	NO	ALIVE & HEALTHY
16	1209329	28	PRIMI WITH 40 WKS WITH CEPLALIC	40 WKS	24.1	NO	YES	4.3	5	3	1.02 (89%)	NO	NO	NO	NO	NO	EMERGENCY	FETAL DISTRESS	N0	ALIVE	YES		2.7	7	8	NO	_	_	NO	ALIVE & HEALTHY
17	10000359	29	G2P1L1 WITH 38 WKS 2DAYS WITH BREECH	WKS 2 DA	27.5	NO	YES	12.1	32	9	0.76(42 %)	NO	NO	NO	NO	NO	EMERGENCY	PREVIOUS LSCS	N0	ALIVE	YES	_	2.7	7	8	NO	_	_	NO	ALIVE & HEALTHY
18	10000471	20	PRIMI WITH 38WKS 3 DAYSWITH CEPLALIC	WKS 3 DA	25.1	NO	YES	9.7	5	11	0.9(78%)	NO	NO	NO	NO	FTVD	N0	_	N0	ALIVE	YES	_	2.7	7	8	NO	_	_	NO	ALIVE & HEALTHY
19	10000028	32	PRIMI WITH 33 WKS 2 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 1 DA	28.9	YES	NO	6.1	5	5	0.98(88 %)	NO	NO	NO	YES	NO	EMERGENCY	PLACENTA PREVIA WITH APH	N0	ALIVE	_	34 WKS 1 DAY	1.8	6	7	YES	RESPIRATORY DISTRESS	7 DAYS	NO	ALIVE & HEALTHY
20	10002085	26	PRIMI WITH 40 WKS POG WITH LATE ONSET	40 WKS	25.9	NO	YES	11.8	8	3	1.22 (>99%)	NO	NO	NO	NO	NO	EMERGENCY	FAILED INDUCTION	N0	ALIVE	YES	_	2.6	7	8	NO	_	_	NO	ALIVE & HEALTHY
21	10002035	28	G2P1L1 WITH 32 WKS 6 DAYS WITH CEPHALIC	WKS 1 DA	26.1	YES	NO	8.6	2	2	1.41 (AEDF)	NO	NO	NO	YES	NO	EMERGENCY	AEDF	N0	ALIVE	_	33 WKS 1 DAY	1.2	6	8	YES	VERY LBW	5 DAYS	KMC 10 DAYS	ALIVE & HEALTHY
22	10002340	29	G3P2L2 WITH 37 WKS WITH CEPHALIC	WKS 1 DA	24.07	NO	YES	12.5	23	3	1.4 (>99%)	NO	NO	NO	NO	FTVD	NO	_	N0	ALIVE	YES	_	2.1	7	9	YES	NEONATAL JAUNDICE	2 DAYS	NO	ALIVE & HEALTHY

23	10003009	23	G2A1 WITH 35 WKS WITH CEPHALIC PRESENTATION WITH	35 WKS	32.8	NO	YES	8.9	10	3	1.5 (AEDF)	NO	YES	NO	YES	NO	EMERGENCY	AEDF	HELLP	ALIVE	NO	35 WKS	1.42	5	6	YES	RESPIRATORY DISTRESS (HYPOXIA)	6 DAYS	NO	ALIVE & HEALTHY
24	10002610	25	G2A1 WITH 37 WKS 6 DAY WITH CEPHALIC PRESENTATION WITH	8 W 1 DA	28.8	YES	NO	15	5	3	0.88(68 %)	NO	NO	NO	NO	NO	EMERGENCY	NON PROGRESS OF LABOUR	N0	ALIVE	YES	_	2.24	6	9	NO	_	KMC FOR 7 DAY		ALIVE & HEALTHY
25	10003038	22	PRIMI WITH 39 WKS 4 DAYSWITH CEPLALIC	WKS 5 DA	22.2	NO	YES	11.09	13	7	0.97(81 %)	NO	NO	NO	NO	FTVD	NO	_	N0	ALIVE	YES	NO	2.48	8	9	NO	_	_	NO	ALIVE & HEALTHY
26	10009159	26	PRIMI WITH 37 WKS 1 DAY WITH CEPHALIC	37 W 3 D	23	NO	YES	10	23	3	1.18 (97%)	YES	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	N0	ALIVE	YES	_	2	7	9	YES	NEONATAL JAUNDICE	2 DAYS	MC FOR 7 DAY	ALIVE & HEALTHY
27	10009179	24	G2P1L0 WITH 36WKS 3 DAY POG WITH	WKS 3 DA	28.7	NO	YES	11	23	9	0.79(41 %)	YES	NO	NO	_	NO	FT EMERGENCY	FAILED INDUCTION	N0	ALIVE	YES	_	2.6	6	7	YES	RESPIRATORY DISTRESS)	2 DAYS	NO	ALIVE & HEALTHY
28	10009443	35	G5P3L3A1 WITH 37 WKS 2DAYS WITH	WKS 3 DA	26.4	NO	YES	7.2	5%	3	0.64(18 %)	YES	NO	NO	NO	FTVD	NO	_	N0	ALIVE	YES	_	2.2	7	8	NO	_	_	NO	ALIVE & HEALTHY
29	10009912	24	PRIMI WITH 39 WKS 3 DAYS WITH CEPLALIC	WKS 3 DA	27.4	NO	YES	3.13	35	8	0.81 (40%)	NO	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	N0	ALIVE	YES	_	2.7	8	9	NO	_	_	NO	ALIVE & HEALTHY
30	10010392	25	PRIMI WITH 37WKS 3 DAYSWITH CEPLALIC	WKS 3 DA	23.1	NO	YES	8.9	24	3	0.68(14 %)	NO	NO	NO	NO	FTND	NO	_	N0	ALIVE	YES	_	2.48	7	8	NO	_	_	NO	ALIVE & HEALTHY
31	10010461	27	PRIMI WITH 38WKS 5 DAYS WITH CEPLALIC PRESENTATION WITH LATE ONSET FGR WITH HYPOTHYROIDISM IN	WKS 5 DA	18.3	NO	YES	10.8	41	7	0.95(55 %)	NO	NO	NO	NO	FTVD	NO	_	YPOTHYROIDIS	ALIVE	YES	_	2.24	7	8	YES	RESPIRATORY DISTRESS	1 DAY	KMC ADMISSION FOR 10 DAYS	ALIVE & HEALTHY
32	10010523	34	G2P1L1 WITH 38WKS 5 DAYS WITH CEPHALIC	WKS 5 DA	21.9	NO	YES	2.7	14	3	0.84(47 %)	NO	NO	NO	NO	NO	FT EMERGENCY	OLIGOHYD ROMNIOS	N0	ALIVE	YES	_	2.6	7	8	NO	_	_	NO	ALIVE & HEALTHY
33	10011475	36	G3P2L1 WITH 28 WKS 6 DAYS POG WITH BREECH	WKS 1DA	25.5	YES	NO	9.9	4	3	1.48(>99%) TO AEDF	YES	YES	NO	YES	NO	PT EMERGENCY	AEDF	N0	ALIVE	NO	29 W1D	920GM	5	7	YES	RESPIRATORY DISTRESS WITH VLBW	41 DAYS	NO	ALIVE & HEALTHY
34	10012377	27	G2P1L1 WITH 37WKS WITH CEPHALIC	WKS 3 DA	27.7	NO	YES	11	4	5	0.9(83%)	NO	NO	NO	NO	NO	FT ELECTIVE	PREVIOUS LSCS	BICORNUATE UTERUS	ALIVE	YES	_	2	8	9	YES	NEONATAL JAUNDICE	2 DAYS	MC FOR 2 DAY	ALIVE & HEALTHY
35	10012457	21	PRIMI WITH 39 WKS 5 DAYS WITH CEPHALIC	40W	31.6	NO	YES	12.6	23	3	0.83(76 %)	YES	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	N0	ALIVE	YES	_	2.8	8	9	NO	_	_	NO	ALIVE & HEALTHY
36	10013112	29	G4P2L1A1 WITH 34 WKS 2 DAYS WITH CEPHALIC PRESENTATION WITH PREVIOUS LSCS WITH	WKS 2 DA	28.3	NO	YES	12.4	20	3	1.14(83 %)	NO	YES	NO	YES	NO	PT EMERGENCY	SEVERE PE WITH IMMINENET SIGN	CHRONIC HTN	ALIVE	YES	34 WKS 2DAY	1.6	6	7	YES	RDS	11 DAYS	NO	ALIVE & HEALTHY
37	10013398	29	PRIMI WITH 39 WKS 5 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 5 DA	25.1	NO	YES	8	2	11	0.88(72 %)	NO	YES	NO	NO	NO	FT EMERGENCY	ANTEPARTUM ECLAMPSIA	ANTEPARTUM ECLAMPSIA	ALIVE	YES	_	2.7	6	8	NO	_	_	NO	ALIVE & HEALTHY
38	10013785	29	G4P2L2A1 WITH 36 WKS WITH CEPHALIC PRESENTATION WITH EARLY ONSET FGR WITH AEDF WITH	36WKS	27.6	YES	NO	7	10	3	1.47(>99%) TO AEDF	YES	NO	NO	YES	NO	PT EMERGENCY	AEDF	NO	ALIVE	NO	36 WKS	1.9	6	8	YES	NEONATAL JAUNDICE	2 DAYS	KMC ADMISSION FOR 10 DAYS	ALIVE & HEALTHY
39	10013643	20	PRIMI WITH 37 WKS 6 DAY WITH CEPHALIC	WKS 6 DA	22.5	NO	YES	11.3	36	3	0.9(54%)	NO	NO	NO	NO	FTVD	NO	_	NO	ALIVE	YES	_	2.3	7	9	YES	NEONATAL JAUNDICE	2 DAYS	MC FOR 2 DAY	ALIVE & HEALTHY
40	10015002	28	G2P1L0 WITH 36WKS 4DAYS POG WITH CEPHALIC PRESENTATION WITH LATE ONSET FGR WITH GESTATIONAL HTN	WKS 5 DA	28.1	NO	YES	17	7	3	1.36(>99%)	YES	NO	NO	YES	NO	PT EMERGENCY	BRAIN SPARING EFFECT	PREVIOUS LSCS WITH BRAIN SPARING EFFECT	ALIVE	NO	36 WKS 5 DAYS	2	7	8	NO	_	_	MC FOR 5 DAY	ALIVE & HEALTHY
41	10015667	33	G3P1L0A1 WITH 32 WKS 4 DAYS WOTH	32WKS 4 D	28.7	YES	NO	15.8	5	3	1.21(88 %)	NO	YES	NO	YES	NO	PT EMERGENCY	PARTIAL HELLP	PARTIAL HELLP	ALIVE	NO	32WKS 4 DAYS	1.3	6	7	YES	PRETERM , LBW	12 DAYS	NO	ALIVE & HEALTHY
42	10016223	28	G3P1L0A1 WITH 36 WKS 5 DAYS WITH CEPHALIC PRESENTATION WITH LATE ONSET FGR WITH	WKS 6 DA	23.6	NO	YES	9.1	13	8	0.71(17 %)	YES	NO	NO	YES	NO	PT EMERGENCY	SEVERE PE WITH IMMINENT SIGNS	NO	ALIVE	NO	36 WKS 5 DAYS	2.49	7	8	NO	_	_	NO	ALIVE & HEALTHY
43	10016961	28	G2A1 WITH 40 WKS 2 DAYS WITH CEPHALIC	WKS 2 DA	23.6	NO	YES	7.3	9	3	0.9(82%)	NO	NO	NO	N0	NO	FT EMERGENCY	FETAL DISTRESS	NO	ALIVE	YES	_	2.5	7	9	NO	_	_	NO	ALIVE & HEALTHY
44	10016880	19	PRIMI WITH 37 WKS 4 DAYS WITH CEPHALIC	WKS 5 DA	27.7	YES	NO	3.7	22	3	1.41(>99%)	NO	NO	NO	NO	NO	FT EMERGENCY	OLIGOHYD ROMNIOS	NO	ALIVE	YES	_	2.2	7	8	YES	HYPOGLYCAEMIA	5 DAYS	NO	ALIVE & HEALTHY
45	10018090	29	G2P1L1 WITH 31 WKS WITH BREECH PRESENTATION WITH	31W	28.5	YES	NO	8.3	8	18	1.6(>99%) TO AEDF	NO	YES	YES	YES	NO	PT EMERGENCY	AEDF	COUVELEIRE UTERUS	FSB	_	31WKS	870GM	0	0	_	_	_	_	FSB
46	10018573	25	PRIMI WITH 31 WKS 3 DAYS WITH CEPHALIC	WKS 3 DA	24.3	YES	NO	9.3	5	3	1.39(>99%)	NO	YES	NO	YES	NO	PT EMERGENCY	HELLP SYNDROME	HELLP	ALIVE	NO	31WKS 3 DAYS	1.2	4	5	YES	RDS	10 DAYS	NO	ALIVE & HEALTHY
47	10018827	26	PRIMI WITH 40 WKS 2 DAYS WITH CEPLALIC PRESENTATION WITH LATE ONSET FGR IN LATENT LABOUR	WKS 3 DA	24.4	NO	YES	4.6	10	4	0.89(81 %)	NO	NO	NO	NO	NO	FT EMERGENCY	OLIGOHYD ROMNIOS	VDRL REACTIVE TPHA NONREACTIVE	ALIVE	YES	_	2.47	8	9	NO	_	_	NO	ALIVE & HEALTHY

48	10018910	19	PRIMI WITH 38WKS 6 DAYS WITH CEPLALIC PRESENTATION WITH	39WKS	27.1	NO	YES	9.5	10	3	0.93(82 %)	NO	NO	NO	NO	NO	FT EMERGENCY	CPD	LEFT UTERINE ARTERY LIGATION	ALIVE	YES	_	2.7	8	9	NO	_	_	NO	ALIVE & HEALTHY
49	10018939	21	PRIMI WITH 39 WKS 5 DAYS WITH CEPLALIC	40 WKS	26.4	NO	YES	8.3	4	3	0.67(43 %)	NO	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	NO	ALIVE	YES	_	2.49	8	9	NO	_	_	NO	ALIVE & HEALTHY
50	10019105	20	PRIMI WITH 37 WKS 3 DAY WITH CEPHALIC	WKS 3 DA	24.4	NO	YES	12	4	2	0.95(81 %)	NO	NO	NO	NO	NO	FT EMERGENCY	CDMR	NO	ALIVE	YES	_	1.7	7	8	YES	RESPIRATORY DISTRESS	16 DAYS	NO	ALIVE & HEALTHY
51	10018972	18	PRIMI 34WKS 4 DAYS WITH BREECH PRESENTATION WITH	WKS 5 DA	19.1	YES	NO	7.9	18	8	1.11(71 %)	NO	NO	NO	YES	NO	PT EMERGENCY	BREECH PRESENTATION	RETROPLACENTAL CLOT PRESENT	ALIVE	NO	34WKS 5 DAYS	1.2	6	7	YES	RESPIRATORY DISTRESS & LBW	15 DAYS	NO	ALIVE & HEALTHY
52	10019428	28	G2P1L1 WITH 34 WKS 4 DAYS WITH CEPHALIC	WKS 6 DA	32.5	NO	YES	15.7	35	6	0.81 (40%)	YES	YES	NO	YES	PTVD	NO	_	HYPOTHYROIDISM	ALIVE	NO	34 WKS 6 DAYS	1.7	7	8	YES	NEONATAL JAUNDICE	8 DAYS	NO	ALIVE & HEALTHY
53	10019241	19	PRIMI WITH 39WKS 6 DAYS WITH CEPHALIC	WKS 6 DA	24.3	NO	YES	14.1	11	3	1.1(96%)	NO	NO	NO	NO	FTND	NO	_	NO	ALIVE	YES	_	2.3	7	9	NO	_	_	MC FOR 3 DAY	ALIVE & HEALTHY
54	10019439	20	PRIMI WITH 39 WKS 3 DAYSWITH CEPHALIC	WKS 4 DA	18.5	NO	YES	1.8	24	3	0.9(79%)	NO	NO	NO	NO	NO	FT EMERGENCY	ANAMNIOS	N0	ALIVE	YES	_	2.49	8	9	NO	_	_	NO	ALIVE & HEALTHY
55	10019609	19	PRIMI WITH 38WKS 3 DAYSWITH CEPHALIC	WKS 6 DA	27.2	NO	YES	9.4	20	5	1.1(90%)	NO	NO	NO	NO	FTVD	NO	_	NO	ALIVE	YES	_	2.3	8	9	NO	_	_	MC FOR 5 DAY	ALIVE & HEALTHY
56	10019738	23	PRIMI 33 WKS 3 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 1 DA	19.6	YES	NO	10	16	3	1.32(98 %)	NO	NO	YES	YES	NO	PT EMERGENCY	ABRUPTIO PLACENTA	RETROPLACENTAL CLOT PRESENT	ALIVE	NO	34 WKS 1 DAY	1.4	5	6	YES	RESPIRATORY DISTRESS WITH LBW	21 DAYS	NO	ALIVE & HEALTHY
57	10019982	21	PRIMI WITH 36WKS 1 DAY WITH CEPHALIC	WKS 1 DA	23.8	NO	YES	12	33	7	0.87(46 %)	YES	YES	NO	YES	NO	PT EMERGENCY	FETAL DISTRESS	NO	ALIVE	NO	36WKS 1 DAY	2.35	7	8	YES	RESPIRATORY DISTRESS	8 DAYS	NO	ALIVE & HEALTHY
58	10013568	25	G2A1 WITH 39WKS 2 DAYS WITH BREECH PRESENTATION WITH	WKS 2 DA	24	NO	YES	7	11	3	0.88(72 %)	NO	NO	NO	NO	NO	FT EMERGENCY	BREECH PRESENTATION	HYPERTHYROIDISM WITH THIN MSL	ALIVE	YES	_	2.6	8	9	NO	_	_	NO	ALIVE & HEALTHY
59	10020214	23	PRIMI WITH 37WKS WITH CEPHALIC	WKS 2 DA	24.7	NO	YES	11.9	5	3	0.86(45 %)	NO	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	SHORT CORD	ALIVE	YES	_	2.2	7	8	NO	_	_	MC FOR 4 DAY	ALIVE & HEALTHY
60	10020379	31	PRIMI WITH 38WKS 2 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 3 DA	22.1	NO	YES	12.06	40	5	1.31(98 %)	YES	NO	NO	NO	FTVD	NO	_	MANUAL REMOVAL OF PLACENTA	ALIVE	YES	_	2.2	7	8	YES	RDS	4 DAYS	NO	ALIVE & HEALTHY
61	10020796	33	PRIMI WITH 36 WKS 5 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 6 DA	23.3	_	YES	10.4	5	3	0.96(83 %)	NO	NO	NO	YES	NO	PT EMERGENCY	NON PROGRESS OF LABOUR	RHD WITH MVP REPAIR	ALIVE	NO	36WKS 6 DAYS	2.25	8	9	NO	_	_	MC FOR 4 DAY	ALIVE & HEALTHY
62	10020817	22	PRIMI 29WKS WITH CEPHALIC	WKS 2 DA	22.06	YES	NO	8.2	1%	1	AEDF	NO	YES	NO	YES	PTVD	NO	_	NO	FSB	_	29 WKS 2 DAYS	700GM	0	0	NO	_	_	_	FSB
63	10020812	27	G3A2 WITH 36 WKS 5 DAYS WITH CEPHALIC PRESENTATION WITH	37 WKS	33.6	NO	YES	9.8	4	5	0.98(88 %)	NO	NO	NO	NO	NO	FT EMERGENCY	NON PROGRESS OF LABOUR	HYPOYHYROIDISM	ALIVE	YES	_	2.2	7	8	YES	NEONATAL JAUNDICE	1 DAY	MC FOR 3 DAY	ALIVE & HEALTHY
64	10020669	24	G2P1L1 WITH 39 WKS 6 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 6 DA	29.4	no	YES	14	5	7	0.99(71 %)	NO	NO	NO	NO	NO	FT EMERGENCY	PREVIOUS LSCS IN LABOUR	PREVIOUS LSCS	ALIVE	YES	_	2.7	7	8	YES	RESPIRATORY DISTRESS	5 DAYS	NO	ALIVE & HEALTHY
65	10020708	37	G3P1L1A1 WITH 38 WKS 4 DAYS WITH	WKS 4 DA	24.2	NO	YES	7.8	4	3	0.99(69 %)	NO	YES	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	BICORNUATE UTERUS MSL	ALIVE	YES	_	1.85	6	7	YES	RESPIRATORY DISTRESS	1 DAY	MC FOR 8 DAY	ALIVE & HEALTHY
66	10020719	26	PRIMI WITH 38 WKS 1 DAY CEPHALIC	WKS 3 DA	19.6	NO	YES	10.6	5	3	0.9(67%)	NO	NO	NO	NO	NO	FT EMERGENCY	FAILED INDUCTION	NO	ALIVE	YES	_	2.4	7	8	NO	_	_	NO	ALIVE & HEALTHY
67	10020970	21	PRIMI WITH 36 WKS WITH CEPHALIC PRESENTATION WITH	WKS 2 DA	23.3	NO	YES	15.8	5	15	1.79(>99%) TO AEDF	YES	NO	NO	YES	NO	PT EMERGENCY	AEDF	NO	ALIVE	NO	36 WKS 2 DAYS	1.8	6	8	YES	RESPIRATORY DISTRESS WITH LBW	1 DAY	MC FOR 11 DAY	ALIVE & HEALTHY
68	10021104	24	G3P2L2 WITH 39 WKS 4 DAYS WITH CEPHALIC	WKS 4 DA	21.9	NO	YES	9.1	21	5	0.68(43 %)	NO	NO	NO	NO	FTND	NO	_	NO	ALIVE	YES	_	2.6	7	8	NO	_	_	NO	ALIVE & HEALTHY
69	10021053	21	PRIMI WITH 38 WKS 6 DAYS CEPHALIC	39WKS	19.04	NO	YES	11.9	34	8	0.78(48 %)	NO	NO	NO	NO	FTVD	NO	_	NO	ALIVE	YES	_	2.6	7	8	NO	_	_	NO	ALIVE & HEALTHY
70	10021532	29	PRIMI WITH 39 WKS 4 DAYS WITH CEPLALIC	WKS 6 DA	29.2	NO	YES	14.4	34	6	0.92(56 %)	NO	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	NO	ALIVE	YES	_	2.6	8	9	NO	_	_	NO	ALIVE & HEALTHY
71	10021697	26	PRIMI WITH 38 WKS 6 DAYS CEPHALIC PRESENTATION WITH	WKS 6 DA	22.1	NO	YES	6.7	2	2	1.1(97%)	NO	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	NO	ALIVE	YES	_	2	6	8	YES	RESPIRATORY DISTRESS	5 DAYS	DIED IN DAY 7	DIED ON DAY 7 OF LIFE
72	10021867	25	PRIMI WITH 33 WKS 6 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 2 DA	29.6	YES	NO	6.8	14	3	1.33(>99%)	NO	NO	NO	YES	NO	PT EMERGENCY	OLIGOHYDROMNIOS	NO	ALIVE	NO	34 WKS 2DAY	1.5	6	8	YES	RESPIRATORY DISTRESS WITH LBW	3 DAYS	MC FOR 9 DAY	ALIVE & HEALTHY
73	10022019	25	G2P1L1 WITH 33 WKS 6 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 6 DA	21.7	NO	YES	5.4	35	8	1.01(68 %)	NO	NO	NO	YES	PTVD	NO	_	PPROM	ALIVE	NO	33 WKS 6 DAYS	1.8	6	7	YES	RESPIRATORY DISTRESS (CPAP)	10 DAYS	NO	ALIVE & HEALTHY
74	10022474	21	PRIMI WITH 32 WKS 5 DAY WITH CEPHALIC PRESENTATION WITH	WKS 5 DA	28.7	NO	YES	11.3	4	3	1.1(72%)	NO	YES	NO	YES	NO	PT EMERGENCY	FETAL DISTRESS	NO	ALIVE	NO	33WKS 6 DAYS	1.46	6	7	YES	RESPIRATORY DISTRESS WITH LBW	3 DAYS	MC FOR 5 DAY	ALIVE & HEALTHY
75	10022694	22	PRIMI WITH 36 WKS 6 DAYS WITH CEPHALIC PRESENTATION WITH	37 WKS	23.1	NO	YES	12.6	35	8	1.04(69 %)	NO	NO	NO	NO	NO	FT EMERGENCY	NON PROGRESS OF LABOUR	NO	ALIVE	YES		2.48	7	8	NO	_	_	NO	ALIVE & HEALTHY

76	10022885	45	ELDERLY PRIMI WITH 36 WKS 1 DAY WITH CEPHALIC	WKS 1 DA	25.9	NO	YES	2.3	5	2	AEDF	YES	YES	NO	YES	NO	PT EMERGENCY	AEDF	ASCITIS PRESENT	ALIVE	NO	36 WKS 1 DAY	1.5	6	7	YES	RESPIRATORY DISTRESS WITH LBW	8 DAYS	NO	ALIVE & HEALTHY
77	10022466	23	PRIMI WITH 38 WKS WITH CEPHALIC PRESENTATION WITH	WKS 3 DA	22.2	NO	YES	10.4	13	4	0.63(22 %)	NO	NO	NO	NO	FTVD	NO	_	GDM	ALIVE	YES		2.4	8	9	YES	HYPERBILLIRUBINAEMIA	3 DAYS	NO	ALIVE & HEALTHY
78	10023194	19	G2A1 WITH 41 WKS WITH CEPHALIC PRESENTATION WITH	41 WKS	23.7	NO	YES	9.4	5	6	0.8(64%)	NO	NO	NO	NO	NO	FT EMERGENCY	NON PROGRESS OF LABOUR	NO	ALIVE	YES		2.4	7	9	NO	_	_	NO	ALIVE & HEALTHY
79	10022225	22	G2A1 WITH 35 WKS 4 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 5 DA	30.2	YES	NO	7	6	15	1.5(>99 %)	YES	YES	NO	YES	NO	PT EMERGENCY	ATYPICAL PE	NO	ALIVE	NO	35 WKS 5 DAYS	1.9	6	7	YES	RESPIRATORY DISTRESS WITH LBW	3 DAYS	NO	ALIVE & HEALTHY
80	10023696	20	G2P1L0 WITH 40 WKS WITH CEPLALIC	WKS 1DA	23.1	NO	YES	10.1	8	3	0.82(49 %)	NO	NO	NO	NO	NO	FT EMERGENCY	PREVIOUS LSCS	PREVIOUS LSCS	ALIVE	YES	_	2.7	7	8	NO	_	_	NO	ALIVE & HEALTHY
81	10023960	21	PRIMI WITH 37 WKS 3 DAY WITH CEPHALIC PRESENTATION WITH LATE ONSET FGR WITH WITH INCREASED RESISTANCE ON DOPPLER WITH	WKS 3 DA	25.8	NO	YES	0	7	3	1.25(98 %)	NO	NO	NO	NO	NO	FT EMERGENCY	ANAMNIOS	ANAMNIOS	ALIVE	YES	_	2.47	6	7	YES	ABDOMINL DISTENSION (? HIRSCHSPRUNG DISEASE)	6 DAYS	NO	ALIVE & HEALTHY
82	10024237	24	G2P1L1 WITH 38WKS 6 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 6 DA	26.2	NO	YES	11	37	4	0.81(49 %)	NO	NO	NO	NO	FTND	NO	_	BETA THALASSEMIA TRAIT	ALIVE	YES	_	2.4	6	8	NO	_	_	NO	ALIVE & HEALTHY
83	10024521	34	PRIMI WITH 40 WKS 1 DAY WITH CEPLALIC	WKS 2 DA	30.1	NO	YES	9.7	15	3	0.74(41 %)	NO	NO	NO	NO	FTVD	NO	_	HYPOTHYROIDISM	ALIVE	YES	_	2.6	7	8	NO	_	_	NO	ALIVE & HEALTHY
84	10024226	20	PRIMI WITH 37 WKS 1 DAY WITH CEPHALIC	WKS 3 DA	25.2	NO	YES	14.1	13	5	0.93(51 %)	NO	NO	NO	NO	NO	FT EMERGENCY	OLIGOHYDROMNIOS	NO	ALIVE	YES	_	2.2	7	8	NO	_	_	MC FOR 5 DAY	ALIVE & HEALTHY
85	10013531	22	PRIMI WITH 37WKS 4 DAYS WITH CEPHALIC PRESENTATION WITH LATE ONSET FGR	WKS 4 DA	28.1	NO	YES	9.8	46	6	0.74(37 %)	NO	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	NO	ALIVE	YES	NO	2.4	7	9	NO	_	_	KMC ADMISSION FOR 10 DAYS	ALIVE & HEALTHY
86	10013617	30	PRIMI WITH 37 WKS 3 DAY WITH CEPHALIC PRESENTATION WITH	WKS 3 DA	25.2	NO	YES	8.9	31	7	1.05(74 %)	YES	NO	NO	YES	NO	PT EMERGENCY	FETAL DISTRESS	HYPOTHYROIDISM	ALIVE	NO	36 WKS 3 DAYS	2.15	8	9	NO	_	_	KMC ADMISSION FOR 5 DAYS	ALIVE & HEALTHY
87	10014046	28	G4P3L3 WITH 38 WKS 4 DAYS WITH CEPHALIC	WKS 4 DA	24.7	NO	YES	11.6	18	8	1.13(88 %)	NO	NO	NO	NO	FTVD	NO	_	NO	ALIVE	YES	NO	2.46	7	8	NO	_	_	NO	ALIVE & HEALTHY
88	10014675	33	G4P3L3 WITH 36 WKS 6 DAYS WITH CEPHALIC	WKS 1 DA	21.3	NO	YES	8.3	38	3	0.9(80%)	NO	NO	NO	NO	NO	FT EMERGENCY	PREVIOUS LSCS	PREVIOUS LSCS	ALIVE	YES	NO	2	7	9	YES	HYPOGLYCAEMIA	17 DAYS	NO	ALIVE & HEALTHY
89	10014825	23	G2P1L1 37WKS 2 DAYS WITH EARLY ONSET FGR WITH PREVIOUS	WKS 3 DA	20.2	YES	NO	6.6	8	6	0.83(76 %)	NO	NO	NO	NO	NO	FT ELECTIVE	PREVIOUS LSCS	PREVIOUS LSCS	ALIVE	YES	NO	2.2	8	9	YES	HYPERBILLIRUBINAEMIA	2 DAYS	MC FOR 3 DAY	ALIVE & HEALTHY
90	10015232	21	PRIMI WITH 35 WKS 3 DAYS CEPHALIC	WKS 6 DA	23.9	NO	YES	4.2	19	3	0.96(81 %)	NO	NO	NO	YES	NO	PT EMERGENCY	FAILED INDUCTION	NO	ALIVE	NO	36WKS 6 DAYS	2.1	7	9	NO	_	_	MC FOR 5 DAY	ALIVE & HEALTHY
91	10015160	21	PRIMI WITH 40WKS 2 DAYS WITH CEPHALIC	WKS 3 DA	27.9	NO	YES	9.4	12	9	0.56(5%)	NO	NO	NO	YES	NO	FT EMERGENCY	FETAL DISTRESS	NO	ALIVE	YES	NO	2.7	8	9	NO	_	_	NO	ALIVE & HEALTHY
92	10015524	22	G2P1L0 WITH 35WKS 4 DAYS POG WITH CEPHALIC	WKS 4 DA	21.6	NO	YES	18.4	18	4	1.8(>99 %)TO AEDF	NO	NO	NO	YES	NO	PT EMERGENCY	AEDF	NO	ALIVE	NO	35 WKS 4 DAYS	1.9	7	8	NO	_	_	KMC ADMISSION FOR 5 DAYS	ALIVE & HEALTHY
93	10015520	31	G3P2L2 WITH 40 WKS 3 DAYS WITH CEPHALIC	WKS 3 DA	24.4	NO	YES	12.4	40	8	0.63(23 %)	NO	NO	NO	YES	NO	FT EMERGENCY	FETAL DISTRESS	NO	ALIVE	YES	NO	2.9	8	9	NO	_	_	NO	ALIVE & HEALTHY
94	10015399	21	PRIMI WITH 37 WKS 5 DAYS WITH CEPHALIC	WKS 5 DA	23.3	YES	NO	10.3	49	3	1.49(>99%)	YES	NO	NO	NO	FTND	NO	_	NO	ALIVE	YES	NO	2	7	8	NO	_	_	MC FOR 4 DAY	ALIVE & HEALTHY
95	10015776	30	PRIMI WITH 39 WKS 5 DAYS WITH CEPHALIC PRESENTATION WITH EARLY ONSET FGR WITH KC/O	WKS 5 DA	26.7	YES	NO	8.8	12	3	0.74(32 %)	YES	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	HYPOTHYROIDISM WITH BRONCHIAL ASTHMA	ALIVE	YES	NO	2.6	8	9	NO	_	_	NO	ALIVE & HEALTHY
96	10014999	21	PRIMI WITH 36 WKS 2 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 2 DA	28.3	NO	YES	7.3	2	3	0.98(88 %)	NO	NO	NO	YES	NO	PT EMERGENCY	BRAIN SPARING EFFECT	NO	ALIVE	NO	36 WKS 2 DAYS	1.7	5	6	YES	LBW	2 DAYS	DIED AT DAY 2 OF LIFE	DIED AT DAY 2
97	10006560	26	G3P2L2 WITH 28 WKS 2 DAYS WITH CEPHALIC PRESENTATION WITH SEVERE PE WITH EARLY ONSET FGR WITH AEDF WITH	WKS 2 DA	26.1	YES	NO	5.04	2	4	AEDF	NO	YES	NO	YES	NO	PT EMERGENCY	AEDF	PREVIOUS 2 LSCS	ALIVE	NO	28 WKS 5 DAYS	600GM	5	6	YES	RESPIRATORY DISTRESS WITH EXTREMELY LBW	2 DAYS	DIED AT DAY 2 OF LIFE	DIED AT DAY 2
98	10008395	36	G2P1L1 WITH 36 WKS POG WITH CEPHALIC	36 WKS	21.09	NO	YES	10.5	37	8	0.87(43 %)	YES	NO	NO	YES	NO	PT EMERGENCY	PREVIOUS LSCS	PREVIOUS LSCS	ALIVE	NO	36WKS 6 DAYS	1.98	7	8	NO	N/A	_	MC FOR 10 DAY	ALIVE & HEALTHY
99	10010319	19	PRIMI WITH 37 WKS 6 DAY WITH CEPHALIC	WKS 6 DA	24.2	NO	YES	15.7	5	8	1(83%)	NO	NO	NO	NO	NO	FT EMERGENCY	FAILED INDUCTION	NO	ALIVE	YES	NO	2.4	7	8	NO	N/A	_	5 DAYS	ALIVE & HEALTHY
100	10010922	23	PRIMI WITH 38WKS 3 DAYSWITH CEPLALIC	WKS 3 DA	20.2	NO	YES	8.9	52	9	1.06(83%)	NO	NO	NO	NO	FTND	NO	N/A	NO	ALIVE	YES	NO	2.6	8	9	NO	N/A	_	NO	ALIVE & HEALTHY

101	10011261	35	PRIMI WITH 36 WKS 5 DAYS WITH CEPHALIC	WKS 5 DA	22.3	NO	YES	12.9	9	5	1.03(75 %)	NO	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	NO	ALIVE	YES	NO	2.2	7	9	NO	N/A	_	MC FOR 6 DAY	ALIVE & HEALTHY
102	10012049	28	G2P1L1 WITH 40 WKS 2DAYS WITH CEPHALIC	WKS 2 DA	20.1	NO	YES	6.8	2	2	0.94(68%)	NO	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	NO	ALIVE	YES	NO	2.4	7	8	YES	RESPIRATORY DISTRESS	2 DAYS	DIED AT DAY 2 OF LIFE	DIED AT DAY 2
103	10012377	27	G2P1L1 WITH 37WKS 1 DAY WITH CEPHALIC	WKS 4 DA	27.7	NO	YES	11	4	5	0.89(71 %)	NO	NO	NO	NO	NO	FT ELECTIVE	PREVOUS LSCS	PREVIOUS LSCS	ALIVE	YES	NO	2	8	9	NO	N/A	_	MC FOR 3 DAY	ALIVE & HEALTHY
104	10012728	23	PRIMI WITH 37 WKS 4 DAY WITH CEPHALIC PRESENTATION WITH LATE ONSET FGR WITH	WKS 5 DA	24.8	NO	YES	11	12	3	1.16 (>99%)	YES	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	NO	ALIVE	YES	NO	1.78	6	8	YES	LBW WITH HYPERBILLIRUNINAEMIA	3 DAYS	MC FOR 3 DAY	ALIVE & HEALTHY
105	10014345	31	G3P1L1A0V1 WITH 38 WKS WITH CEPHALIC PRESENTATION WITH SEVERE PE LATE ONSET FGR WITH	WKS 2 DA	26.9	NO	YES	10.2	5	11	1.2 (92%)	NO	YES	NO	YES	NO	PT EMERGENCY	SEVERE PE WITH IMMINENT SIGNS	SEVERE PE	ALIVE	NO	34 WKS 2DAY	1.56	6	8	YES	RESPIRATORY DISTRESS	3 DAYS	MC FOR 10 DAY	ALIVE & HEALTHY
106	10031322	23	G2P1L1 WITH 34 WKS 4 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 6 DA	24.03	NO	YES	9.5	17	3	0.94(84 %)	NO	NO	NO	YES	NO	PT EMERGENCY	PREV LSCS	PREVIOUS LSCS WITH RHD	ALIVE	NO	36WKS 6 DAYS	2	7	8	NO	N/A	_	MC FOR 8 DAY	ALIVE & HEALTHY
107	10032719	34	PRIMI WITH 38 WKS 5 DAYS CEPHALIC PRESENTATION WITH	WKS 6 DA	25.6	NO	YES	6.2	9	3	0.9(96%)	NO	NO	NO	NO	NO	FT ELECTIVE	OLIGOHYDROMNIOS	K/C/O ISCHAEMIC STROKE	ALIVE	YES	NO	2.1	8	9	YES	NEONATAL JAUNDICE	2 DAYS	NO	ALIVE & HEALTHY
108	10032890	24	G2P1L1 WITH 35WKS 5 DAYS WITH CEPHALIC	37 WKS	21.5	NO	YES	10.2	5	3	1.33(>99%)	NO	NO	NO	NO	NO	FT ELECTIVE	PREVIOUS LSCS	NO	ALIVE	YES	NO	1.9	7	8	YES	RESPIRATORY DISTRESS	1 DAY	MC FOR 8 DAY	ALIVE & HEALTHY
109	10034809	23	PRIMI WITH 36 WKS 5 DAYS WITH CEPHALIC	37 WKS	23.3	NO	YES	13.9	20	3	1.48(99 %)	NO	NO	NO	NO	FTVD	NO	NIL	HYPOTHYROIDISM	ALIVE	YES	NO	1.8	7	8	NO	N/A	_	MC FOR 5 DAY	ALIVE & HEALTHY
110	10035025	31	G2P1L1 WITH 34 WKS 5 DAYS WITH CEPHALIC	WKS 5 DA	28.6	NO	YES	11.4	34	4	1.1(52%)	NO	NO	NO	YES	NO	PT EMERGENCY	FETAL DISTRESS	PREVIOUS LSCS	ALIVE	NO	34WKS 5 DAYS	2.1	6	7	NO	N/A	_	KMC 24 DAYS	ALIVE & HEALTHY
111	10037799	29	G5P3L2A1 WITH 36 WKS 2 DAYS WITH	37 WKS	34.5	YES	NO	10.2	12	3	1.4 (>99%)	YES	NO	NO	NO	NO	FT ELECTIVE	FETAL DISTRESS	PREVIOUS 2 LSCS	ALIVE	YES	NO	2.3	8	9	NO	N/A	_	NO	ALIVE & HEALTHY
112	10037996	27	G2P1L1 WITH 38WKS 2 DAYS WITH CEPHALIC	WKS 4 DA	26.8	NO	YES	13.6	6	12	0.76(42 %)	NO	NO	NO	NO	NO	FT EMERGENCY	PREVIOUS LSCS	PREVIOUS LSCS	ALIVE	YES	NO	2.3	8	9	NO	N/A	_	MC FOR 6 DAY	ALIVE & HEALTHY
113	10038021	21	PRIMI WITH 37 WKS 2 DAY WITH CEPHALIC	WKS 4 DA	25.4	NO	YES	19	11	9	1.13(91 %)	NO	NO	NO	NO	NO	FT EMERGENCY	FAILED INDUCTION	NIL	ALIVE	YES	NO	2.4	8	9	NO	N/A	_	NO	ALIVE & HEALTHY
114	10038017	23	PRIMI WITH 37 WKS WITH CEPHALIC	WKS 1 DA	23.1	NO	YES	11.4	24	3	0.9 (52%)	NO	NO	NO	NO	NO	FT EMERGENCY	CPD	NIL	ALIVE	YES	NO	2.6	7	8	NO	N/A	_	NO	ALIVE & HEALTHY
115	10038038	22	G2P1L0 WITH 37WKS 5 DAY POG WITH CEPHALIC	WKS 6 DA	33.3	NO	YES	2	3	11	1.08(73%)	NO	NO	NO	N0	NO	FT EMERGENCY	OLIGOHYDROMNIOS	CHRONIC HTN WITH OVERT DM	ALIVE	YES	NO	2.3	6	7	NO	N/A	_	NO	ALIVE & HEALTHY
116	10038205	23	PRIMI WITH 38 WKS 6 DAYS CEPHALIC	WKS 2 DA	23.7	NO	YES	10.2	24	3	0.98(88 %)	NO	NO	NO	YES	FTVD	NO	NIL	NIL	ALIVE	YES	NO	2.46	8	9	NO	N/A	_	NO	ALIVE & HEALTHY
117	10038348	23	G3P1L1D1 WITH 37 WKS WITH CEPHALIC PRESENTATION WITH	WKS 1 DA	23.1	NO	YES	8.1	38	8	1.21(97 %)	NO	NO	NO	NO	NO	FT EMERGENCY	PREVIOUS 2 LSCS	PREVIOUS 2 LSCS	ALIVE	YES	NO	2	6	8	YES	HYPERBILLIRUBINAEMIA	2 DAYS	MC FOR 5 DAY	ALIVE & HEALTHY
118	10039932	21	PRIMI WITH 38WKS 1 DAY WITH CEPHALIC	WKS 2 DA	26.2	NO	YES	9.4	2	2	1.02(78 %)	NO	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	NO	ALIVE	YES	NO	2.2	6	8	YES	RESPIRATORY DISTRESS	1 DAY	MC FOR 7 DAY	ALIVE & HEALTHY
119	10040539	23	G3P2L2 WITH 33 WKS 4 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 3 DA	23.4	NO	YES	10.6	4	2	1.19(88 %)	NO	NO	NO	YES	NO	PT EMERGENCY	COMPLETE PLACENTA PREVIA	PLACENTA PREVIA	ALIVE	NO	34 WKS 3 DAYS	1.6	5	7	YES	RESPIRATORY DISTRESS & LBW	5 DAYS	KMC 10 DAYS	ALIVE & HEALTHY
120	10040924	34	G3P2L1D1 WITH 33 WKS 4 DAYS WITH LATE ONSET FGR WITH	WKS 3 DA	31.1	NO	YES	7.1	5	3	1.64(>99%)	NO	NO	NO	YES	NO	PT EMERGENCY	BRAIN SPARING EFFECT	CHRONIC HTN	ALIVE	NO	35 WKS 3 DAYS	1.8	7	8	YES	RESPIRATORY DISTRESS	2 DAYS	MC FOR 10 DAY	ALIVE & HEALTHY
121	10041390	25	G2P2L2 WITH 36 WKS 5 DAYS WITH PREVIOUS	WKS 4 DA	22.9	NO	YES	10.2	5	14	1.02(74 %)	NO	NO	NO	NO	NO	FT ELECTIVE	PREVIOUS LSCS	PREVIOUS LSCS	ALIVE	YES	NO	2.6	8	9	NO	NIL	_	NO	ALIVE & HEALTHY
122	10041706	21	PRIMI WITH 39 WKS 4 DAYSWITH CEPLALIC	WKS 5 DA	24.4	NO	YES	13.7	5	6	0.82(37 %)	NO	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	ANAEMIA	ALIVE	YES	NO	2.34	7	9	NO	N/A	_	MCI FOR 8 DAY	ALIVE & HEALTHY
123	10042262	21	G2A1 WITH 35 WKS 2 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 3 DA	34.6	NO	YES	5.3	9	3	1.85(>99%)	NO	NO	NO	YES	NO	PT EMERGENCY	OLIGOHYDROMNIOS	NIL	ALIVE	NO	35 WKS 3 DAYS	1.6	6	9	YES	RESPIRATORY DISTRESS & LBW	5 DAYS	MC FOR 6 DAY	ALIVE & HEALTHY
124	10042770	20	PRIMI WITH 36 WKS 6 DAYS WITH CEPHALIC	WKS 2 DA	20.8	NO	YES	12.9	6	12	1.15(93 %)	NO	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	NIL	ALIVE	YES	NO	2.48	8	9	NO	N/A	_	NO	ALIVE & HEALTHY
125	10042982	31	G4P3L3 WITH35 WKS POG WITH LATE ONSET	WKS 1 DA	22.7	NO	YES	5.3	4	3	0.93(50 %)	NO	YES	NO	YES	PTVD	N/A	N/A	CHRONIC HTN	ALIVE	NO	35 WKS 1 DAY	2	7	8	NO	N/A	_	MC FOR 8 DAY	ALIVE & HEALTHY
126	10043022	28	PRIMI WITH 37 WKS 1 DAY WITH CEPHALIC	WKS 2 DA	23.1	NO	YES	11.2	4	3	1.5(>99 %)	NO	NO	NO	YES	FTND	N/A	N/A	HYPOTHYROIDISM	ALIVE	YES	NO	2.3	7	8	NO	N/A	_	MC FOR 6 DAY	ALIVE & HEALTHY
127	10043111	31	PRIMI WITH 38 WKS 3 DAYS CEPHALIC	WKS 3 DA	26.3	NO	YES	9.4	20	8	1.13(91 %)	NO	NO	NO	NO	FTVD	N/A	N/A	PROM	ALIVE	YES	NO	2.3	8	9	NO	N/A	_	MC FOR 6 DAY	ALIVE & HEALTHY
128	10046633	26	PRIMI WITH 37 WKS 5 DAYS WITH CEPHALIC	WKS 2 DA	23.1	NO	YES	10.8	5	5	0.8(27%)	NO	NO	NO	NO	FTVD	N/A	N/A	NIL	ALIVE	YES	NO	2.2	7	8	NO	N/A	_	MC FOR 4 DAY	ALIVE & HEALTHY

129	10046865	23	G3P2L2 WITH 236 WKS 6 DAYS WITH PREVIOUS 2 LSCS	WKS 1 DA	25.6	NO	YES	9.9	8	5	0.87(50 %)	NO	NO	NO	NO	NO	FT ELECTIVE	PREVIOUS 2 LSCS	PREVIOUS 2 LSCS	ALIVE	YES	NO	2.3	7	8	YES	HYPERBILLI RUBINAEMI A	3 DAYS	MC FOR 3 DAY	ALIVE & HEALTHY
130	10046790	27	G5P1L1A3 WITH 35 WKS 5 DAYS POG WITH	WKS 6 DA	22.2	YES	NO	9.7	5	14	0.8(28%)	NO	NO	NO	YES	NO	PT ELECTIVE	PREV LSCS	RHD WITH PREV LSCS	ALIVE	NO	36WKS 6 DAYS	2	6	8	YES	RESPIRATOR Y DISTRESS	2 DAYS	MC FOR 12 DAY	ALIVE & HEALTHY
131	10047159	24	PRIMI WITH 40 WKS 1 DAY WITH CEPLALIC	WKS 2 DA	24	NO	YES	8	5	8	0.82(37 %)	NO	NO	NO	NO	NO	FT EMERGENCY	FETAL DISTRESS	NIL	ALIVE	YES	NO	2.3	8	9	NO	N/A	_	MC FOR 6 DAY	ALIVE & HEALTHY
132	10047352	20	PRIMI WITH 37 WKS 2 DAY WITH CEPHALIC	WKS 3 DA	24.3	NO	YES	9.1	7	32	0.89(48 %)	NO	NO	NO	NO	FTVD	N/A	N/A	NIL	ALIVE	YES	NO	2.5	8	9	NO	N/A	_	NO	ALIVE & HEALTHY
133	10047543	24	G4P2L2E1 WITH 37 WKS 3 DAYS POG WITH	WKS 3 DA	25.2	NO	YES	13.8	5	62	1.37(99 %)	NO	NO	NO	NO	NO	FT EMERGENCY	PREVIOUS 2 LSCS	PREVIOUS 2 LSCS	ALIVE	YES	NO	2.2	7	8	NO	N/A	_	MC FOR 6 DAY	ALIVE & HEALTHY
134	10047591	18	PRIMI WITH 37 WKS 1 DAY WITH CEPHALIC PRESENTATION WITH	WKS 2 DA	28.7	NO	YES	8.8	5	5	1.2(97%)	NO	NO	NO	NO	FTVD	N/A	N/A	NIL	ALIVE	YES	NO	1.92	6	8	YES	HYPERBILLI RUBINAEMI A	1 DAY	MC FOR 7 DAY	ALIVE & HEALTHY
135	10047707	23	G2P1L1 WITH 38WKS 5 DAYS WITH CEPHALIC	WKS 5 DA	21.7	NO	YES	9	59	3	1.08(82 %)	NO	NO	NO	NO	FTND	N/A	N/A	NIL	ALIVE	YES	NO	2.36	7	8	NO	N/A	_	MC FOR 4 DAY	ALIVE & HEALTHY
136	10047699	25	G2A1 WITH 36 WKS 4 DAYS WITH CEPHALIC	WKS 6 DA	23	NO	YES	8	70	9	1.09(72 %)	NO	YES	NO	YES	NO	PT EMERGENCY	FETAL DISTRESS	SEVERE PE	ALIVE	NO	36WKS 6 DAYS	2.3	7	8	YES	NEONATAL JAUNDICE	2 DAYS	MC FOR 5 DAY	ALIVE & HEALTHY
137	10047946	24	G2P1L1 WITH 38WKS 2 DAYS WITH CEPHALIC	39WKS	30.7	NO	YES	18.5	5	40	0.62(7%)	NO	NO	NO	NO	NO	FT ELECTIVE	PREVIOUS LSCS	PREVIOUS LSCS	ALIVE	YES	NO	2.6	8	9	NO	N/A	_	NO	ALIVE & HEALTHY
138	10047983	28	PRIMI WITH 38 WKS 3 DAYS CEPHALIC PRESENTATION WITH	WKS 3 DA	25.7	NO	YES	15.1	5	3	0.76(43 %)	NO	NO	NO	NO	FTVD	N/A	N/A	NO	ALIVE	YES	NO	2.47	7	8	YES	HYPERBILLI RUBINAEMI A	3 DAYS	NO	ALIVE & HEALTHY
139	10048580	26	PRIMI WITH 32 WKS 5 DAYS WITH CEPHALIC PRESENTATION WITH EARLY ONSET FGR WITH INCREASED	WKS 6 DA	21.2	YES	NO	13.5	5	5	2.26(>99%) TO AEDF	NO	NO	NO	YES	NO	PT EMERGENCY	AEDF	TOXOPLASMA IgG POSITIVE	ALIVE	NO	32 WKS 6 DAYS	1.4	6	7	YES	RDS	22	NO	ALIVE & HEALTHY
140	10048577	29	G2P2L1 WITH 38 WKS POG WITH CEPHALIC	WKS 3 DA	24	NO	YES	9.2	2	3	0.88(73 %)	NO	NO	NO	NO	NO	FT EMERGENCY	PREVIOUS LSCS	PREVIOUS LSCS	ALIVE	YES	NO	2.5	7	8	NO	N/A	_	NO	ALIVE & HEALTHY
141	10048489	26	G2P1L1 WITH 36 WKS POG WITH CEPHALIC	WKS 1 DA	23.9	NO	YES	13	5	18	0.82(46 %)	NO	NO	NO	NO	FTND	N/A	N/A	NO	ALIVE	YES	NO	2.35	6	7	YES	RESPIRATOR Y DISTRESS	2 DAYS	MC FOR 4 DAY	ALIVE & HEALTHY
142	100484497	19	PRIMI WITH 36 WKS 5 DAYS WITH CEPHALIC PRESENTATION WITH LATE ONSET FGR WITH INCREASED	WKS 6 DA	22.6	NO	YES	10.6	5	5	1.34 (99%)	NO	NO	NO	YES	NO	PT EMERGENCY	LED INDUCTI	NIL	ALIVE	NO	36WKS 6 DAYS	2.2	7	8	YES	HYPERBILLI RUBINAEMI A WITH VOMITING	5 DAYS	NO	ALIVE & HEALTHY
143	10048785	19	PRIMI WITH 35 WKS 6 DAYS CEPHALIC	36 WKS	19.4	NO	YES	11.7	46	9	0.89(41 %)	NO	NO	NO	YES	PTVD	N/A	N/A	PPROM	ALIVE	NO	36 WKS	2.1	7	8	NO	N/A	_	MC FOR 6 DAY	ALIVE & HEALTHY
144	10048893	24	G3P2L2 WITH 38 WKS 1 DAYS WITH CEPHALIC	WKS 1 DA	22	NO	YES	11	7	27	1.1 (90%)	NO	NO	NO	NO	NO	FT EMERGENCY	PREVIOUS LSCS	PREVIOUS LSCS	ALIVE	YES	NO	2.2	7	8	NO	N/A	_	MC FOR 6 DAY	ALIVE & HEALTHY
145	10048840	20	PRIMI WITH 36 WKS 6 DAYS WITH CEPHALIC	WKS 1 DA	23.1	NO	YES	10.7	5	3	1.2(>99 %)	NO	NO	NO	NO	NO	FT EMERGENCY	OGRESS OF L	NIL	ALIVE	YES	NO	2.2	7	8	NO	N/A	_	MC FOR 6 DAY	ALIVE & HEALTHY
146	10049056	26	PRIMI 34WKS 6 DAYS WITH CEPHALIC	WKS 4 DA	24.7	YES	NO	8.4	42	9	1.15(86%)	NO	NO	NO	YES	PTVD	N/A	_	NO	ALIVE	NO	36 WKS 4 DAYS	2.4	6	8	YES	FETAL DISTRESS	1 DAY	NO	ALIVE & HEALTHY
147	10049779	19	PRIMI WITH 38 WKS CEPHALIC	WKS 2 DA	25.6	NO	YES	10	4	5	1.1 (90%)	NO	NO	NO	NO	FTVD	N/A	N/A	NIL	ALIVE	YES	NO	2.48	7	8	YES	RESPIRATOR Y DISTRESS	2 DAYS	MC FOR 9 DAY	ALIVE & HEALTHY
148	10049618	33	G3P1L1A1 WITH 36 WKS 4 DAYS WITH CEPHALIC	WKS 5 DA	29.7	NO	YES	13.2	5	13	0.79(41 %)	NO	NO	NO	YES	PTVD	N/A	N/A	HYPOTHYROI DISM WITH ITP	ALIVE	NO	36 WKS 5 DAYS	2.4	6	6	YES	POOR TONE & RDS	7 DAYS	NO	ALIVE & HEALTHY
149	10049764	21	PRIMI WITH 40 WKS 2 DAYS WITH CEPLALIC	WKS 3 DA	30.2	NO	YES	8.6	18	3	0.81 (76%)	NO	NO	NO	NO	FTVD	N/A	N/A	NIL	ALIVE	YES	NO	2.6	8	9	NO	N/A	_	NO	ALIVE & HEALTHY
150	10050267	20	G2P1L1 WITH 38WKS 5 DAYS WITH CEPHALIC	WKS 5 DA	22.3	NO	YES	12.4	5	9	0.92(78 %)	NO	NO	NO	NO	FTVD	N/A	N/A	PROM	ALIVE	YES	NO	2.1	8	9	NO	N/A	_	MC FOR 6 DAY	ALIVE & HEALTHY
151	10050487	30	G2P1L1 WITH 37WKS 3 DAYS WITH CEPHALIC	WKS 4 DA	25.3	NO	YES	14.8	9	25	1.03(75 %)	YES	NO	NO	NO	NO	FT EMERGENCY	REVIOUS LSC	PREVIOUS LSCS, GDM	ALIVE	YES	NO	2.5	7	9	NO	N/A	_	NO	ALIVE & HEALTHY
152	10034541	24	G2P1L1 WITH 34 WKS 1 DAY WITH CEPHALIC PRESENTATION WITH	38 WKS	18.9	YES	NO	16.5	28	4	1.42 (>99%)	NO	NO	NO	NO	NO	FT EMERGENCY	BRAIN SPARING EFFECT	PREVIOUS LSCS	ALIVE	YES	NO	2.03	7	8	NO	N/A	_	MC FOR 6 DAY	ALIVE & HEALTHY
153	10050543	21	G2A1 WITH 38 WKS 4 DAYS WITH CEPHALIC	WKS 5 DA	20.7	NO	YES	9.6	6	22	0.93(88 %)	NO	NO	NO	NO	NO	FT EMERGENCY	TAL DISTRE	RH NEGATIVE PREGNANCY	ALIVE	YES	NO	2.47	7	8	NO	N/A	_	NO	ALIVE & HEALTHY
154	10050748	24	PRIMI WITH 36 WKS 4 DAYS WITH CEPHALIC PRESENTATION WITH	WKS 4 DA	28.6	NO	YES	9.7	5	3	AEDF	NO	NO	NO	YES	NO	PT EMERGENCY	AEDF	PREV LSCS, GDM,HYPOTH YROIDISM	ALIVE	NO	36 WKS 4 DAYS	2.1	7	8	NO	N/A	_	MC FOR 7 DAY	ALIVE & HEALTHY
155	10050825	27	G3P2L1D1 WITH 36 WKS 4 DAYS POG WITH	WKS 5 DA	18.4	NO	YES	9.6	5	20	0.86(56 %)	NO	NO	NO	YES	NO	PT EMERGENCY	PREVOUS 2 LSCS	PREVIOUS 2 LSCS	ALIVE	NO	36 WKS 5 DAYS	1.99	7	8	NO	N/A	_	MC FOR 5 DAY	ALIVE & HEALTHY
156	10051075	30	PRIMI WITH 32 WKS 1 DAY WITH CEPHALIC PRESENTATION WITH EARLY ONSET FGR WITH INCREASED	WKS 3 DA	24.5	YES	NO	12.3	9	3	1.42 (>99%) TO AEDF	NO	NO	NO	YES	NO	PT EMERGENCY	AEDF	NIL	ALIVE	NO	32 WKS 3 DAYS	1.04	6	7	YES	LBW WITH PRETERM	7 DAYS	SEPSIS	DIED DUE TO SEPSIS ON DAY 7
157	10051570	23	PRIMI WITH 41 WKS WITH CEPLALIC	41 WKS	26.8	NO	YES	0.8	5	6	1.03(89 %)	NO	NO	NO	NO	NO	FT EMERGENCY	ANAMNIOS	NIL	ALIVE	YES	NO	2.4	7	9	NO	N/A	_	MC FOR 6 DAY	ALIVE & HEALTHY

158	10051624	42	ELDERLY G3P1L1A1 WITH 37 WKS 4 DAYS	WKS 4 DA	28.5	NO	YES	24.8	5	19	0.83(28 %)	NO	NO	NO	NO	NO	FT EMERGENCY	PREVIOUS LSCS	PREVIOUS LSCS	ALIVE	YES	NO	2.3	7	8	YES	? TEF	11 DAYS	NO	ALIVE & HEALTHY
159	10051941	27	G2P1L1 WITH 38WKS 2 DAYS WITH CEPHALIC	WKS 3 DA	24.6	NO	YES	12.2	5	12	0.78(35 %)	NO	NO	NO	NO	NO	FT EMERGENCY	REVIOUS LSC	PREVIOUS LSCS	ALIVE	YES	NO	2.49	7	8	NO	N/A	_	NO	ALIVE & HEALTHY
160	10052805	20	PRIMI WITH 39WKS 6 DAYS WITH CEPHALIC	WKS 6 DA	30.2	NO	YES	10.2	35	8	0.89(82%)	NO	NO	NO	NO	FTND	N/A	N/A	NIL	ALIVE	YES	NO	2.5	8	9	NO	N/A	_	NO	ALIVE & HEALTHY
161	10052697	23	PRIMI WITH 33 WKS 5 DAYS WITH CEPHALIC	WKS 6 DA	23	NO	YES	1.58	6	19	0.85(73 %)	YES	NO	NO	YES	NO	PT EMERGENCY	GOHYDROMN	RH NEGATIVE PREGNANCY	ALIVE	NO	33 WKS 6 DAYS	1.75	6	8	YES	PRETERM , LBW	2 DAYS	KMC FOR 14 DAYS	ALIVE & HEALTHY
162	10052321	29	PRIMI WITH 40 WKS WITH CEPLALIC	40 WKS	23.1	NO	YES	2.48	4	2	0.9(83%)	NO	NO	NO	NO	NO	FT EMERGENCY	GOHYDROMN	NIL	ALIVE	YES	NO	2.6	7	8	NO	N/A	_	NO	ALIVE & HEALTHY
163	10052364	22	PRIMI WITH 39 WKS WITH CEPLALIC	39WKS	28.7	NO	YES	10.6	5	19	0.83(62 %)	NO	NO	NO	NO	FTVD	N/A	N/A	NIL	ALIVE	YES	NO	2.6	7	9	NO	N/A	_	NO	ALIVE & HEALTHY
164	10052174	19	PRIMI WITH 37 WKS 1 DAY WITH CEPHALIC	WKS 1 DA	21.6	YES	NO	9	3	3	0.89(70 %)	NO	NO	NO	NO	FTVD	N/A	N/A	HSV IGM POSITIVE	ALIVE	YES	NO	1.9	6	8	YES	RESPIRATOR Y DISTRESS	11 DAYS	NO	ALIVE & HEALTHY
165	10052072	31	PRIMI WITH 40 WKS WITH CEPLALIC PRESENTATION WITH	WKS 1DA	24.5	NO	YES	8.1	6	3	0.73(39 %)	NO	NO	NO	NO	NO	FT EMERGENCY	TAL DISTRES	NIL	ALIVE	YES	NO	2.5	7	8	YES	HYPERBILLI RUBINAEMI A	2 DAYS	NO	ALIVE & HEALTHY
166	10050213	23	PRIMI WITH 36 WKS 2 DAYS WITH CEPHALIC	WKS 6 DA	28.5	NO	YES	8.4	11	3	1.31(>9 9%)	NO	NO	NO	YES	PTVD	N/A	N/A	NIL	ALIVE	NO	36WKS 6 DAYS	2.06	6	8	NO	N/A	_	MC FOR 7 DAY	ALIVE & HEALTHY
167	10051332	22	PRIMI WITH 37WKS WITH CEPHALIC	WKS 1 DA	24.6	NO	YES	11.3	5	15	1.09(83 %)	NO	NO	NO	NO	FTVD	N/A	N/A	NIL	ALIVE	YES	NO	2.63	7	8	NO	N/A	_	NO	ALIVE & HEALTHY
168	10051054	27	G4P2L2A1 WITH 38WKS 3 DAYS WITH CEPHALIC	WKS 3 DA	25.6	NO	YES	8.5	5	20	0.79(42 %)	NO	NO	NO	NO	FTVD	N/A	N/A	NIL	ALIVE	YES	NO	2.49	7	8	YES	HYPERBILLI RUBINAEMI A	2 DAYS	NO	ALIVE & HEALTHY
169	10053147	22	PRIMI WITH 39 WKS WITH CEPHALIC PRESENTATION WITH	WKS 1 DA	24.9	NO	YES	5.4	6	3	0.72(42 %)	NO	NO	NO	NO	NO	FT EMERGENCY	MSL	NIL	ALIVE	YES	NO	2.48	8	9	YES	HYPERBILLI RUBINAEMI A	2 DAYS	NO	ALIVE & HEALTHY
170	10053886	34	G2P1L1 WITH 38 WKS 2DAYS WITH	WKS 2 DA	22.6	NO	YES	12.5	5	25	0.82(42 %)	NO	NO	NO	NO	NO	FT ELECTIVE	REVIOUS LSC	POLIOMYELITI S	ALIVE	YES	NO	2.6	7	9	NO	N/A	_	NO	ALIVE & HEALTHY
171	10052691	20	PRIMI 30 WKS 2 DAYS WITH CEPHALIC	WKS 4 DA	23.4	YES	NO	3.48	4	2	1.37(>9 9%)	YES	YES	NO	YES	PTVD	N/A	N/A	HELLP	ALIVE	NO	30 WKS 4 DAYS	1.1	5	6	YES	RESPIRATOR Y DISTRESS	20 DAYS	NO	ALIVE & HEALTHY
172	10053551	34	G2P1L0 WITH 40 WKS 2 DAYS WITH CEPLALIC	WKS 2 DA	29.6	NO	YES	7.2	18	9	0.92(86 %)	NO	NO	NO	NO	NO	FT EMERGENCY	REVIOUS LSC	PREVIOUS LSCS	ALIVE	YES	NO	2.3	7	8	NO	N/A	_	MC FOR 7 DAY	ALIVE & HEALTHY
173	10052932	34	G3P1L1A1 WITH 33 WKS 5 DAYS POG WITH CEPHALIC	WKS 5 DA	28.9	YES	NO	5	8	7	0.9(43%)	YES	YES	NO	YES	NO	PT EMERGENCY	ARTUM ECLA	ANTEPARTUM ECLAMPSIA	ALIVE	NO	33WKS 5 DAYS	1.48	6	7	YES	RESPIRATOR Y DISTRESS WITH LBW	6 DAYS	KMC FOR 12 DAYS	ALIVE & HEALTHY
174	10054357	31	G3P1L1A1 WITH 35 WKS 5 DAYS POG WITH	WKS 6 DA	27.4	NO	YES	15.3	23	9	0.92(78 %)	NO	NO	NO	YES	PTVD	N/A	N/A	PPROM	ALIVE	NO	35 WKS 5 DAYS	1.9	7	8	YES	RESPIRATOR Y DISTRESS	2 DAYS	MC FOR 8 DAY	ALIVE & HEALTHY
175	10054856	24	G2P1L1 WITH 35 WKS 1 DAY POG WITH	WKS 1 DA	22.5	YES	NO	ANAMNIOS	5	3	0.89(44 %)	NO	NO	NO	YES	NO	PT EMERGENCY	ANAMNIOS	RUBELLA IgM POSITIVE	ALIVE	NO	35 WKS 1 DAY	1.85	7	8	YES	RESPIRATOR Y DISTRESS	3 DAYS	MC FOR 10 DAY	ALIVE & HEALTHY
176	10054870	23	G3P1L1 WITH 36 WKS POG WITH LATE ONSET	36 WKS	19	NO	YES	6.5	6	3	0.87(62 %)	NO	NO	NO	YES	PTVD	N/A	N/A	PPROM	ALIVE	NO	36 WKS	2	7	8	NO	N/A	_	MC FOR 8 DAY	ALIVE & HEALTHY
177	10054832	33	G3P1L1A1 WITH 37 WKS 6 DAYS POG WITH CEPHALIC	WKS 6 DA	29.4	NO	YES	1.3	7	3	1 (71%)	NO	NO	NO	NO	NO	FT EMERGENCY	OLIGOHYD ROMNIOS	PREVIOUS LSCS	ALIVE	YES	NO	2.41	7	8	NO	N/A	_	NO	ALIVE & HEALTHY
178	10038232	22	PRIMI WITH 36 WKS 4 DAYS WITH CEPHALIC	WKS 5 DA	25.2	NO	YES	ANAMNIOS	6	3	1.3(>99 %)	NO	NO	NO	YES	NO	PT EMERGENCY	ANAMNIOS	NO	ALIVE	NO	36 WKS 5 DAYS	1.9	7	8	YES	RESPIRATOR Y DISTRESS	1 DAY	MC FOR 12 DAY	ALIVE & HEALTHY
179		23	PRIMI WITH 37 WKS 4 DAY WITH CEPHALIC	WKS 5 DA	23	YES	NO	13.2	5	2	1.4 (>99%)	NO	NO	NO	NO	NO	FT ELECTIVE	N SPARING EF	NO	ALIVE	YES	NO	2	6	8	YES	RESPIRATOR Y DISTRESS	2 DAYS	MC FOR 7 DAY	ALIVE & HEALTHY
180		28	PRIMI WITH 36 WKS 4 DAYS WITH CEPHALIC	WKS 6 DA	27	NO	YES	2.6	18	5	0.78(27 %)	NO	NO	NO	YES	NO	PT EMERGENCY	GOHYDROMN	NO	ALIVE	NO	36 WKS 6 DAYS	2.2	7	8	NO	N/A	_	MC FOR 4 DAY	ALIVE & HEALTHY