"A PROSPECTIVE STUDY OF CEREBROPLACENTAL RATIO: A MARKER OF IMPAIRED FETAL GROWTH VELOCITY AND ADVERSE OUTCOME"

By

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ABSTRACT

Background:

Antenatal detection of Fetal Growth Restriction (FGR) and its antepatum survelliance is initially done by different methods one among them is the Doppler studies by using Middle Cerebral Artery (MCA), Umbilical Artery (UA) Indices .The umbilical artery assesses the resistance to blood perfusion of the fetoplacental which detects early maternal or placental conditions obliterating muscular arteries. Result in a progressive decrease in end-diastolic flow in the umbilical artery Doppler waveform until absent and then reversed flow which represents an advanced stage of placental compromise, commonly associated with severe IUGR and oligohydramnios.

It is also noted as Middle cerebral artery peak systolic velocity may be a better predictor of Intra Uterine Growth Restriction (IUGR). Here, blood flow redistribution known as the brain-sparing reflex, is characterized by increased end-diastolic flow velocity (reflected by a low PI) in the middle cerebral artery.

Current challenges in the clinical management of IUGR include accurate diagnosis of the truly growth-restricted fetus, selection of appropriate fetal surveillance is been assessed with the cerebroplacental ratio, defined as middle cerebral artery PI/umbilical artery PI.

The cerebroplacental ratio has been proposed as a marker of failure of growth potential. Low cerebroplacental ratio, regardless of the fetal size, is independently associated with the need for operative delivery for fetal compromise and adverse fetal outcome, as CPR proves to be more reliable for assessment for fetal well being.

Objective:

The main aim was to evaluate the cerebroplacental ratio at term as a marker of reduced fetal growth rate and to investigate the relationship between low cerebroplacental ratio at term with reduced fetal growth velocity and adverse perinatal outcome.

Design:

It was a Prospective study of 200 singleton pregnancies in a tertiary care hospital. The abdominal circumference was measured between 20-24 weeks' gestation, and both abdominal circumference and fetal Dopplers to measure Middle Cerebral Artery and Umbilical Artery indices were recorded at or beyond 35 weeks of gestation. Abdominal circumference values were converted into Z scores and centiles of birth weight and fetal Doppler parameters, adjusting for gestational age. Abdominal circumference growth velocity was quantified using the difference in abdominal circumference Z score, at or beyond 35 weeks compared with the scan between 20-24 weeks. The logistic regression analyses were performed to investigate the association between low cerebroplacental ratio, low abdominal circumference, growth velocity and to identify and adjust for potential confounders.

Results:

The study included 200 pregnancies in which we found that total number of operative deliveries were about 71 cases (48%). Out of 75 cases Low CPR 27 cases (36%) underwent operative deliveries (p=0.909), of 125 cases Normal CPR 44cases (35.2%) underwent operative deliveries. Hence, CPR remained not significantly associated with the risk of operative delivery for fetal compromise (p= 0.023).

Conclusion:

Among the 200 cases of study population 75 cases (37.5%) and 125 cases (62.5%)were having low and normal Cerebro Placental Ratio (CPR) .The study reveals higher incidence of low Abdominal Circumference (AC) and Small for Gestational Age (SGA) babies among low CPR group compared to normal CPR women.

The present study showed no difference in the incidence of Cesearean section delivery for fetal compromise ,low APGAR Score at 5 minutes (<7) and admission to Neonatal Intensive Care Unit among the low CPR and normal CPR group women.

However, multicentric studies with large sample size are required to further investigate the usefulness of CPR in predicting adverse maternal and perinatal outcome.

Key words: CerebroPlacental Ratio (CPR), Neonatal Intensive Care Unit (NICU), Small for Gestational Age (SGA), Appropriate for Gestational Age (AGA),Large for Gestational Age (LGA).

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INTRODUCTION:

Fetal growth restriction is a condition where the fetus fails to achieve its genetic growth potential and is consequently at the risk of increased perinatal mortality and morbidty(1). Various terms like Intra Uterine Growth Restriction / Intra Uterine Growth Retardation (IUGR) and lately Fetal Growth Restriction (FGR) to describe the condition are used.

The American College of Obstetricians and Gynaecologists (ACOG) defines FGR as fetal weight less than 10^{th} percentile for gestational age and Small for Gestational Age(SGA) as newborn with birth weigh tless than 10^{th} percentile.(1)

The terms FGR and SGA are often used interchangeably because the most common definition of FGR is a neonate with birth weight below the 10th percentile for gestational age, the same as the definition of SGA.(2)

There are many for the definition of FGR, hence other classifications have been used by different researchers like Usher and McLean (1969) suggested that fetal growth standards should be based on mean weights-for-age, with normal limits defined by ±2 standard deviations. This definition would limit SGA infants to 3 percent of births instead of 10 percent.

As there is progressive increase in both perinatal mortality and morbidity rates the birthweight percentile decreases.

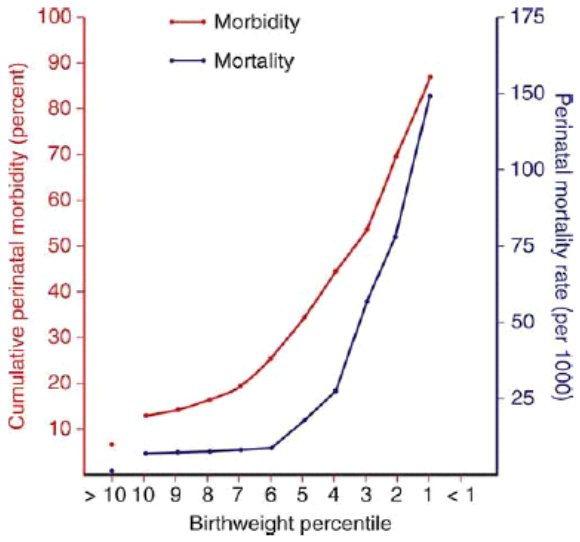

Figure 1: Relationship between birth weight percentile and perinatal mortality and morbidity rates

More recently, individual fetal-growth potential is proposed to replace a population-based threshold. In this model, a fetus that deviates from its individual optimal size at a given gestational age is considered either overgrown or growth restricted (Chiossi, 2017). Such optimal projections are based on maternal race or ethnicity

ETIOLOGY:

FGR is not a disease, but it is a manifestation of fetal, maternal and/or placental disorders that affect fetal growth. The fetal prognosis is largely dependent on the aetiology, severity and time of onset.

A) Fetal causes

Chromosomal disorders.: Fetuses with chromosomal abnormalities, including trisomy 13, 18 and 21, contribute to approximately 5—20% of FGR cases. Other chromosomal abnormalities including autosomal deletions, sex chromosome abnormalities like 45 XO and mosaic cell lines have also been associated with growth restriction. These foetuses especially present with early onset FGR[3]

Structural anomalies

All major structural defects involving the central nervous system, cardiovascular, gastrointestinal (gastroschisis), genitourinary and musculoskeletal systems are associated with an increased risk of FGR. If growth restriction is found in association with polyhydramnios, the incidence of structural anomaly is substantially increased. Some ultra sound markers which has been found to have an association with FGR are single umbilical artery (UA) and echogenic cardiac focus.[4,5]

Genetic causes.

Maternal genes have shown to have greater influence on fetal growth. Many genes including the gene for gluocokinae have been implicated in programming of growth. Certain inborn errors of metabolism such as agenesis of the pancreas, congenital lipodystrophy, galactosaemia and phenylketonuria result in growth restriction in the fetus.

Multifetal gestation:

About 15—30% twin gestation fetuses develop FGR and it is more common in mono-chorionic twins affected with twin-to-twin transfusion syndrome. These pregnancies are normal initially and FGR manifests after 28—30 weeks of gestation. [6]

The incidence further increases to 60% in triplet and quadruple pregnancies, which are of course rare nowadays because of the practice of fetal reduction.

Inborn errors of metabolism.

Although rare, these may be the cause of FGR.

B)**Maternal causes**

Maternal characteristics:

Extremes of maternal age, nulliparity or grand multiparity, historv of FGR in the previous pregnancy and low pre-pregnancy maternal weight gain contribute to increased risk of FGR.

Maternal diseases.

Uteroplacental insufficiency resulting from medical complications such as hypertension, renal disease, autoimmune disorders, hyperthyroidism or long-term insulin dependent diabetes places the fetus at an increased risk of FGR. These conditions influence fetal growth primarily by reducing blood supply via the uterine arteries, depriving substrate supply to the fetus. In pre-eclampsia, due to deficicient trophoblastic invasion which leads to incomplete remodelling of spiral arteries, plascental perfusion is markedly reduced leading to poor nutrient supply to the fetus. Congential heart disease, particularly cyanotic heart disease is associated with growth-restricted infants. Maternal respiratory diseases such as cystic fibrosis, bronchiectasis, kyphoscoliosis and asthma also affect fetal growth. Diabetes is Usally associated with a large fetus but long-standing diabetes associated with vasculopathy may lead to growth restriction.[7]

Nutritional factors.

Chronic maternal malnutrition before pregnancy is associated with higher risk of FGR and premature birth, thus increasing the chances of infant morbidity and mortality in the first year of life. [8]

Smoking.

Active and passive smoking, especially in the second and third trimesters, is an important cause of FGR. Mothers who smoke during pregnancy generally delivers infant weighing 100-300g less than children born to non-smoking mothers. Maternal smoking accounts for 10-40% cases of FGR in the United States. Nicotine has a vasoconstrictive effect on the maternal circulation and leads to formation of toxic metabolites in the fetus.

Substance abuse and drugs

Alcohol crosses the placenta freely. Excessive alcohol intake acts as cellular poison produces the fetal alcohol syndrome when consumed in early pregnanacy and FGR during 2^{nd} and 3^{rd} trimesters. Consumption of alcohol, more than 3 units/day (1unit contains 10ml of pure alcohol), increases the risk of FGR three-fold. Cocaine and opiates are potent vasoconstrictors. Their use have sufficient influence on the uterine vasculature to cause FGR. Therapeutic medications such as warfarin, anticonvulsants (valproic acid) and antineoplastic agents (cyclophosphamide) are also implicated growthrestriction. [9]

Thrombophilias.

Antiphospholipid antibody syndrome and other acquired thrombophilias are associated with growth restriction. The likely mechanisms are placental thrombosis and impaired trophoblastic function. Hereditary thrombophilias are usually not associated with compromised fetal growth.[14]

Infectious disease

Congenital rubella: there is a higher incidence of the disease in developing countries [32,33]. Fetal involvement is observed in the vast majority of cases in which maternal infection occurs in the first trimester. As it is one of the rare cause of FGR.

Human Immunodeficiency Virus (HIV) Infection: a relationship between HIV seropositivity and the increased risk of spontaneous abortion, stillbirth, IUGR, low birth weight, premature delivery and neuro-developmental alteration has been observed[34]. The association between premature birth and low birth weight has also been related to the use of highly active antiretroviral therapy (HAART) . In these patients, an increased risk of placental insufficiency has been described [15].

Malaria: this infection causes a massive sequestration of erythrocytes in the syncytiotropho-blast. Multiple mechanisms contribute to fetal growth restriction, including abnormal vascu-larization, impaired growth hormone expression, difficulty in transporting nutrients, and a process of inflammation and activation of the immune response [16].

C)**Mullerian anomalies:**

Unicornuate and septate uterus are also associated with higher incidence OF IUGR

D) Placental causes:

Abnormal placentation resulting in reduced placental perfusion is the most common cause associated with FGR. Placenta is the sole channel to transfer of nutrients and oxygen from mother to the fetus for adequate fetal growth and development. It also act as barrier and protects fetus from pathogens.

Blood flow provides nutrient from uterine arteries to the intervillous space .It also has around 75-100 uterine veins which provide oxygenated blood to the feus through a low resistence circuit. Inadequate placentation may be associatedwith poor nutrient supply to the fetus thus causing impaired fetal growth .Reduced uteroplacental perfusion because of maternal vascular disease is the most common in non anomalous fetus25-30%(17)

Abnormal placentation such as placenta praecia,abruption,circumvillate placenta ,velamentous cord inertion,bilobed placenta and placental tumors like chorioangioma have been found to be associated with IUGR.

Histological features like peri and intervillous fibrinoid necrosis,syncytial knots,vascular stasis,intravillous micro-calcification with villous necrobiosis area and placental infarction also contribute to IUGR.

SERUM MARKER:

Serum markers linked to IUGR

The placentation process starts with the migration of trophoblastic cells that invade the walls of spiral arteries and transform them from small caliber high resistant vessels into wide caliber low resistant vessels that deliver blood at low pressure to the intervillous space.

Then, the utero-placental circulation develops in two stages: the first stage (until the 10th week of gestation) consists in endovascular plugging of the spiral arteries by trophoblastic cells, subsequently followed by invasion and destruction of the intradecidual spiral arteries; the second stage (between 14-16 weeks of gestation) consists in the invasion of the inner miometrial part of the spiral arteries [27]. The

impaired spiral artery transformation is leading to weak development of the utero-placental circulation and is implied in the pathology of preeclampsia and IUGR(18)

Pregnancy associated plasma protein A (PAPPA), an Insulin–like Growth Factor Binding Protein Protease whose levels depend on placental volume and function . As low PAPP A is associated with poor fetal growth.(dugoff 2010) The maternal low levels of serum PAPP-A at 11-13 weeks of gestation resulted significantly associated to adverse pregnancy outcomes [19]. Low levels of PAPP-A were mentioned as predictors of IUGR also by Goetzinger et al. in 2009 and Poon et al. in 2009 [20].

The intra uterine insult occurring in earlier (8-12weeks) period affects the cellular hyperplasia stage resulting in symmetrical reduction of the organ size and leading to symmetrical IUGR fetus. If any intra uterine insult occurs in later period (18-34weeks) of gestation cell size will be affected resulting in asymmetrical IUGR. The asymmetrical IUGR fetuses are noted to be at higher risk for major anomalies, low birth weight, perinatal mortality, hypertensive disorders of pregnancy, preterm delivery, cesarean section for fetal distress and overall poor outcomes, compared to symmetrical IUGR [2] The IUGR has a long-term prognosis in neurological, cardio-vascular, and metabolic development [22–23]. This would mean that, regardless of severity, chronic exposure to an adverse intrauterine environment is essential to develop adverse fetal programming.

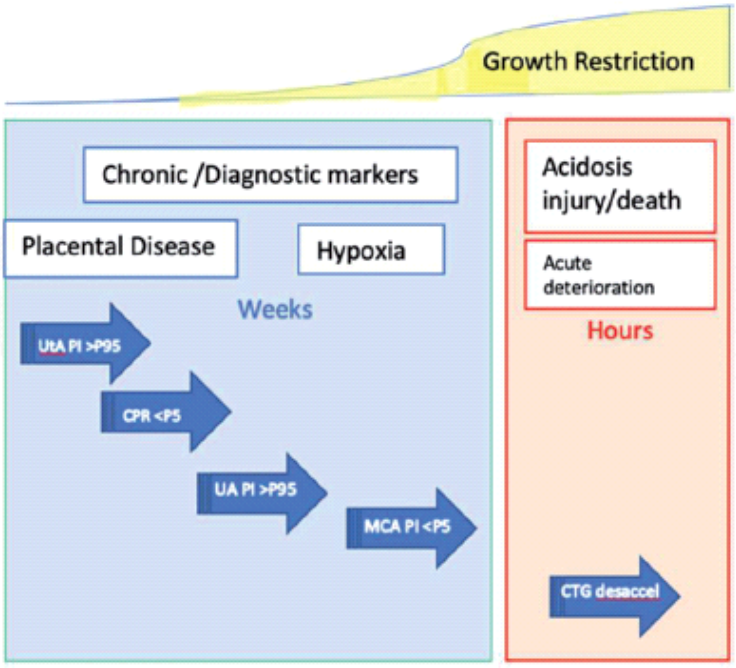

Figure 2: Sequence of changes of moderate late-onset IUGR.

The evidence suggests that both early and late onset IUGR are a consequence of a placental disease, but it is unknown to what extent they are the same type of pathology. Placental insufficiency of early onset IUGR is associated with histological signs of alteration in early implantation [25]. It is not clear, however, if late IUGR is a mild form of abnormal placental implantation at the beginning of the pregnancy or if it is an added placental damage produced in the second half of pregnancy [21].

Diagnosis of FGR

It is very important to identify the high risk of developing FGR based on history and associated pregnancy complication like pre-eclampsia, weight gain during pregancy and co-morbid conditions. Women with one or more major risk factors should have the Umbilical Artrey Doppler (UAD) Assessment between 20-24 weeks. If UAD is abnormal with pulsatile index (PI) > 95 percentile and or diastolic notching, these women should

be monitored with serial ultrasound measurements with UAD from 26-28 weeks of pregnancy.(4)

Determination of gestational age is the utmost importance for diagnosis of FGR. The gestational age is usually calculate by Last Menstrual Period (LMP) , but measurement of first trimester croum lump length by ultrasonograpy is more accurate.

CLINICAL EXAMINATION:

Women with low Body Mass Index (BMI), Poor maternal weight gain during pregnancy may be associated with FGR, which also have influence on birth weight of the newborn. Therefore womens should be counselled regarding their dietary intake, in both quality and quantity.

Clinically, the first-line screening tool to assess fetal growth is abdominal palpation and assessment of fundal height. If the fetus is felt bigger or smaller for gestational age, an ultrasound for biometric assessment is performed to confirm the diagnosis. Using a tape measure can provide some objectivity to this observation. Fundal height or Symphisio Fundal Height (SFH) is measured using a measuring tape in centimetres, from the pubic symphysis to the clinically determined upper level of the uterine fundus. It usually corresponds in centimetres to the gestational age between 20 and 36 weeks. Its sensitivity is affected by various maternal parameters like maternal obesity, full bladder, amniotic fluid abnormalities, parity and ethnicity. FGR can be suspected if difference between expected and observed values in fundal height is 3.0 cm or more. The accuracy Of SFH measurement may be improved by using customized charts or percentile curves; FGR is suspected if the fundal height falls below the 10th percentile in the growth chart. Hence, clinical examination is better method for diagnosis FGR.

SONOGRAPHIC EVALUATION

On routine sonographic evaluation of all pregnancies is the opportunity to diagnose growth restriction. Typically, such routine screening incorporates an early initial sonographic examination—usually at 16 to 20 weeks' gestation. Increasingly, a first-trimester examination is added to establish gestational age and identify anomalies. Some then recommend repeat sonographic evaluation at 32 to 34 weeks to evaluate fetal growth. Crovetto et al reported additional sonographic evaluations of fetal growth rate performed as clinically indicated.

With sonography, the most common method for identifying poor fetal growth is estimation of weight using multiple fetal biometrical measurements. Combining head, abdomen, and femur dimensions provides optimum accuracy, whereas little incremental improvement is gained by adding other biometrical measurements. Of the dimensions, femur length measurement is technically the easiest and the most reproducible. Biparietal diameter and head circumference measurements are dependent on the plane of section and may also be affected by deformative pressures on the skull. Last, abdominal circumference measurements are more variable. However, these are most frequently abnormal with fetal-growth restriction because soft tissue predominates in this dimension.

a) Fetal biometry

Crown-Rump Length

Once the embryonic pole is visualized (just before 6 weeks), measurement of the CRL of the embryo is considered the most accurate method to date the pregnancy(22).

Fetal parameters measured to assess fetal growth include biparietal diameter (BPD), head circumstances (HC) and femur length, and these parameters are combined to calculate estimated fetal weight (EFW)

Among the most widely used formulas for estimating fetal weight are those published in 1985 by Hadlock and colleagues (23).These formulas have been tested by multiple authors. Although attempts have been made to improve fetal weight prediction with other formulas, none has been developed that outperforms the Hadlock formulas consistently and across all types of patient populations.(23)

Table 1: Approach to fetal weight estimation

Approach to fetal Weight Estimation	
Body parts imaged	formula used for weight estimate
Head, abdomen and femor	
OFD measurable	Formula 1. using corrected BPD in place of BPD
OFD not measurable	Formula 1
head and abdomen	
OFD measurable	Formula 2. using corrected BPD in place of BPD
OFD not measurable	Formula 2
Abdomen and femor	Formula 3

Formula 1

$$\text{Log}_{10}(\text{EFW}) = 1.4787 - 0.003343\,\text{AC}\times\text{FL} + 0.001837\,\text{BPD}^2 + 0.0458\,\text{AC} + 0.158\,\text{FL}$$

Formula 2

$$\text{Log}_{10}(\text{EFW}) = 1.1134 + 0.05845\,\text{AC} - 0.000604\,\text{AC}^2 - 0.007365\,\text{BPD}^2 + 0.00595\,\text{BPD}\times\text{AC} + 0.1694\,\text{BPD}$$

Formula 3

$$\text{Log}_{10}(\text{EFW}) = 1.3598 + 0.051\,\text{AC} + 0.1844\,\text{FL} - 0.0037\,\text{AC}\times\text{FL}$$

AC, abdominal circumference, in cm; BPD, biparietal diameter, in cm; EFW, estimated fetal weight, in g; FL, femur length, in cm; OFD, occipitofrontal diameter, in cm.

*Data from Hadlock FP, Harrist RB, Carpenter RJ, et al: Sonographic estimation of fetal weight: the value of femur length in addition to head and abdomen measurements. Radiology 150:535-540, 1984.

Fetal size in proportion to that expected for age is assessed by comparing the EFW to norms for gestational age. The metric used for this purpose is the weight percentile. Determining the weight percentile, once the gestational age has been established and the fetal weight estimated, is accomplished using formulas . Selecting the most appropriate table is important for making sure the weight percentiles apply to the population being scanned.

Table 2: Fetal weight percentiles in the third trimester

FETAL WEIGHT PERCENTILE IN THIRD TRIMESTER			
Gestational Age (weeks)	WEIGHT PERCENTILE (g)		
	10th	50th	90th
26	570	860	1320
27	660	990	1470
28	770	1150	1660
29	890	1310	1890
30	1030	11460	2100
31	1180	1630	2290
32	1310	1810	2500
33	1480	2010	2690
34	1670	2220	2880
35	1870	2430	3090
36	2190	2650	3290
37	2310	2870	3470
38	2510	3030	3610
39	2680	3170	3750
40	2750	3280	3870
41	2800	3360	3980
42	2830	3410	4060
43	2840	3420	4100
44	2790	3390	4110

Biophysical profile

Biophysical profile (BPP) or Biophysical score or Manning score is the combined use of five fetal biophysical variables as a more accurate means of assessing fetal health than a single element. Typically, these tests require 30 to 60 minutes of examiner time.

The five fetal biophysical components assessed:

1. Heart rate acceleration,
2. Breathing,
3. Movements,
4. Tone, and
5. Amnionic fluid volume.

Normal variables were assigned a score of 2 each, and abnormal variables were given a score of 0. Thus, the highest score possible for a normal fetus is 10.

Table 3: Components and scores for the biophysical profile

COMPONENT AND SCORES FOR THE BIOPHYSICAL PROFILE		
Component	**Score 2**	**Score 0**
Nonstress best	≥2 acceleration of ≥ 15 beats /min for ≥ 15 sec within 20-40min	0 or 1 acceleration within 20-40 min
fetal breathing	≥1 episode of rhythmic breathing lasting ≥30 sec within 30 min	< 30 sec of breathing within 30 min
Fetal movement	≥3 discrete body or limb movement within 30 min	< 3 discrete movements
Fetal tone	≥episode of extrernity extension and subsequent return to flexicty	D-extension/flex on events
Amnionic fluid volume	A pocket of amonic fluid that measures atleast 2cm in two plainers perpendicular to each other (2x2cm pocket)	Largest single vertical pocket ≤ 2 cm

Table 4: Interpretation of BPP

Interpretation of BPP		
Biophysical Profile Score	**Interpretation**	**Recommended Management**
10	Normal, nonasphyodated fetus	no fetal indiacation for intervention; repair test weekly except in diabetics patients and postterm pregnancy (twice weekly)
8/10 (normal AFV)	Normal, nonasphyodated fetus	no fetal indiaction fo intervention; repair testing protocol
8/8 (NST not done)		
8/10 (Decreased AFV)	Chronic fetal asphyxia suspected	
6	Possible fetal asphyxia	Deliver
		If amnioic fluid volume abnormal, deliver
		If normla fluid at > 36 weeks with favourablecervix, deliver
		If repeat test ≤ 6, deliver
		If repeat test >-6, observe and repeat per protocol
4	Probable fetal asphyxia	Repeat testing same day, if biophysical profile score 6, deliver
0 to 2	Almost certain fetal asphyxia	deliver

Biophysical score of 0 was almost invariably associated with significant fetal acidemia, whereas a normal score of 8 or 10 was associated with normal pH. An equivocal test result—a score of 6—was a poor predictor of abnormal outcome. As the abnormal score dropped from 2 or 4 down to 0, this decline was a more accurate predictor of abnormal fetal outcome.

Doppler:

Doppler flow studies are an important adjunct to fetal biometry in identifying FGR fetus at the risk of adverse fetal outcomes. A Doppler is a non-invasive method to detect FGR by the extent of utero- placental insufficiency. Uteroplacental insufficiency is associated with altered blood flow resistance in the uterine, placental and fetal vasculature. The most widely used arterial indices for measureing the utero-placental insufficiency are pulsatility index, systolic to diastolic ratio and resistance index of uterine artery, middle cerebral artery and umbilical artery.

Umbilical Artery Doppler:

By measuring the umbilical artery Doppler to provides both diagnostic and prognostic information for diagnosis of IUGR. The progression of the Doppler patterns of the UA towards an absent or reverse diastolic flow correlates with the risk of fetal hypoxic injury or death [24].

The umbilical arterial circulation is normally a low-impedance circulation, with an increase in the amount of end-diastolic flow with advancing gestation.[25] Umbilical arterial Doppler waveforms reflect the status of the placental circulation, and the increase in end-diastolic flow that is seen with advancing gestation is a direct result of an increase in the number of tertiary stem villi that takes place with placental maturation. [26]

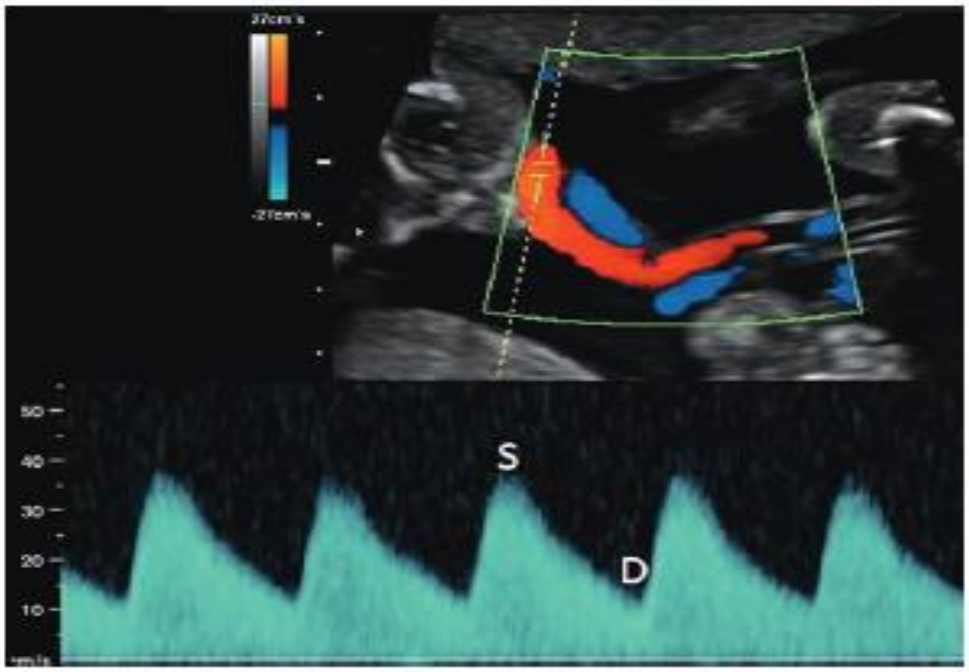

Figure 3: Doppler waveform of the umbilical artery in normal fetus

The obliteration of small muscular arteries in placental tertiary stem villi result in a progressive decrease in end-diastolic flow in the umbilical arterial Doppler waveforms until absent, and then resulting in reverse flow during diastole which is suggestive of IUGR or suspected Pre-ecampsia[27]

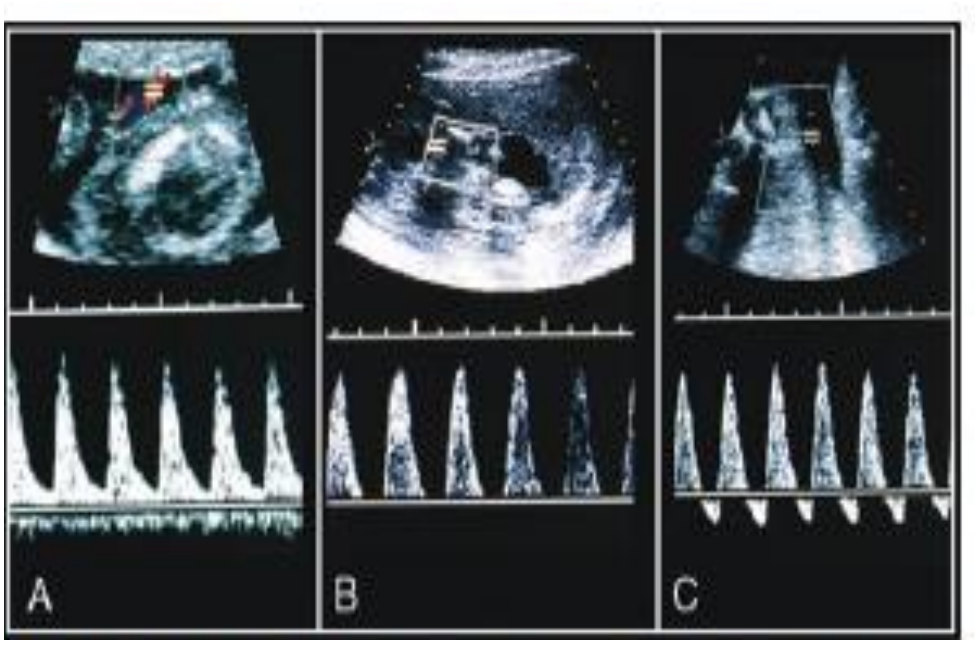

Figure 4: Abnormal umbilical artery waveform;A)decreased end-diastolic velocity B)absent end diastolic velocity C)reversed end diastolic velocity

Absent end- diastolic flow is an useful feature, underlying fetal vascular stress which indicated fetal compromise .

Reversed diastolic flow in the umbilical arterial circulation represents an advanced stage of placental compromise and is associated with more than 70% of placental arterial obliteration(28). In occasion of absent or reversed end-diastolic flow in the umbilical artery is commonly associated with severe FGR and oligohydramnios.(29) Only in pregnancies with suspected FGR does the use of umbilical artery Doppler sonography reduce the number of perinatal deaths and unnecessary obstetric interventions.(30)

Doppler waveforms of the umbilical arteries can be obtained from any segment along the umbilical cord. Waveforms obtained from the placental end of the cord show more end-diastolic flow and thus lower ratio values (resistive index [RI], systole/diastole [S/D] ratio) than waveforms obtained from the abdominal cord insertion.[17]

The umbilical artery (UA) is usually the first fetal blood vessel to be affected by placental insufficiency. The initial increase in placental blood flow, vascular impedance, causes a retrograde increase of blood flow resistance in the UA.1 The placental insufficiency further deteriorates, blood flow resistance in the descending aorta increases, resulting in more blood diverted through the aortic isthmus shunt to reach the fetal brain. This phenomenon is reflected by a decreased middle cerebral artery pulsatility index (MCA-PI), making it the second vascular marker in the cascade of placental insufficiency28 Early detection of abnormal blood flow redistribution patterns is important for efficient fetal Doppler monitoring and is part of meticulous surveillance, with a potential benefit to reduce fetal morbidity and mortality31

Middle Cerebral Artery Doppler:

The MCA is the most accessible cerebral vessel to ultrasound imaging in the fetus, and it carries more than 80% of cerebral blood flow.[19] The cerebral circulation is normally a high-impedance circulation with continuous forward flow throughout the cardiac cycle.(20) In the presence of fetal hypoxemia, central redistribution of blood flow occurs, resulting in increased blood flow to the brain (Fig. 22-5), heart, and adrenals and a reduction in flow to the peripheral and placental circulations.

The presence of cerebral vasodilation is one of the hypoxic bio-marker in the middle cerebral artery Doppler, It is one of the late manifestation. Fetuses with low MCA-PI have a six times higher risk going for emergency cesarean section due to suspected loss of fetal well-being than fetuses with a normal PI [4 0].

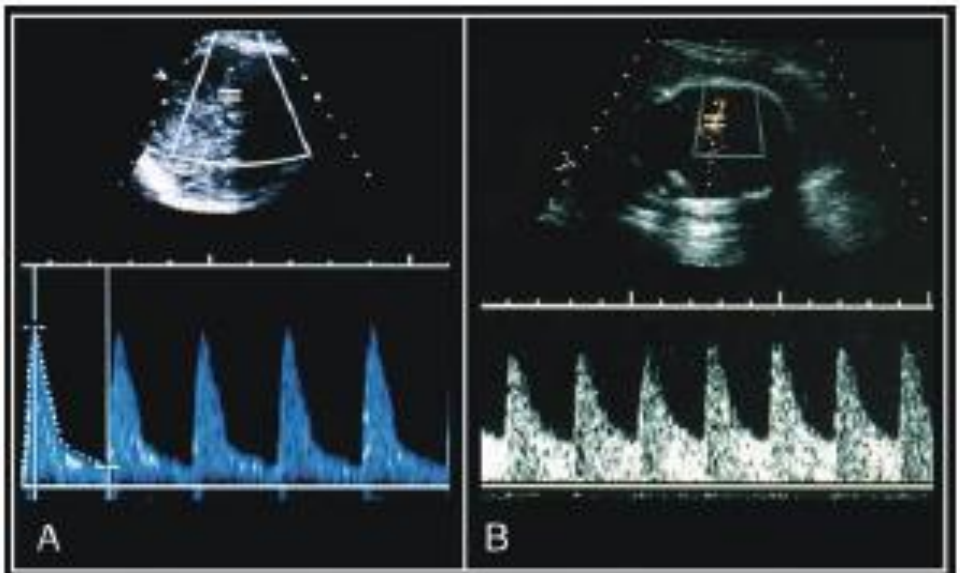

Figure 5: Doppler waveform of middle cerebral artery in normal fetus (A) and in a hypoxemic fetus (B) .

Note: the increase in end diastolic velocity in fetus B resulting from a low –impendence cerebral circulation as part of the brain-sparing reflex.

This blood flow redistribution is known as the brain-sparing effect and plays a major role in fetal adaptation to oxygen deprivation.[33] The right and left middle cerebral arteries represent major branches of the circle of Willis in the fetal brain. The circle of Willis, which is supplied by the internal carotid and vertebral arteries, can be imaged with color flow Doppler sonography in a magnified axial plane of the fetal head obtained at the base of the skull, at the level of the thalami and wings of sphenoid bone In this plane, the proximal and distal middle cerebral arteries are seen in their long axis, with their course almost parallel to the ultrasound beam. As such, the insonating beam, which is parallel to the vessel and thus has an angle of insonation of 0 degrees, will result in a measured velocity that accurately reflects the true velocity of blood in this vessel (cos 0 = 1).

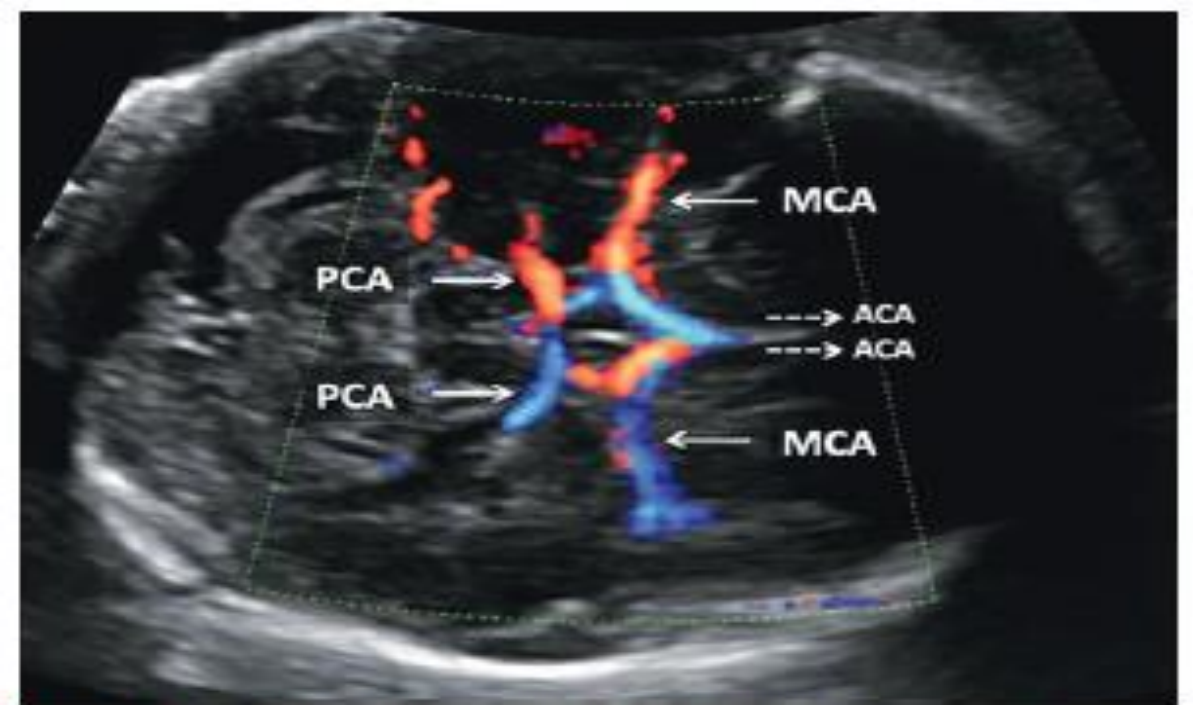

Figure 6: Circle of Willis – color Doppler image.anterior cerebral artery (ACA);middle cerebral artery (MCA);posterior cerebral artery (PCP)

MCA Doppler waveforms, obtained from the proximal third portion of the vessel, immediately after its origin from the circle of Willis, have shown the best reproducibility.

Cerebro-Placental Ratio(CPR):

The CPR was first described in the 1980s, interest in this assessment tool has been rekindled because of recent reports associating an abnormal ratio with adverse perinatal outcome and postnatal neurological deficit(34,35)

The CPR predicts the adverse outcome as it is one of the better index .It is the ratio of pulsatility indices of the middle cerebral artery to the Doppler indices pulsatility indices of the umbilical artery. [36].

It has mainly a diagnostic value. It will significantly improves the sensitivity of the UA and the isolated MCA, since the increase in placental impedance (UA-PI) is usually combined with a decrease in brain resistance (MCA-PI) [37-41].

Pulsatile indices of Umbilical artery with respective to gestational age (weeks)

Table 5: Pulsatile index of the umbilical artery between 20-40 weeks of gestation

Pulsatility Index of umbilical Artery Between 20 and 40 Weeks of Gestation			
Gestational Age (weeks)	PULSATILITY INDEX, BY PERCENTILE		
	5th	50th	95th
20	0.94	1.216	1.505
21	0.913	1.189	1.476
22	0.89	1.165	1.45
23	0.869	1.142	1.427
24	0.849	1.122	1.405
25	0.831	1.102	1.385
26	0.813	1.084	1.365
27	0.798	1.065	1.346
28	0.78	1.048	1.327
29	0.764	1.031	1.308
30	0.748	1.014	1.29
31	0.732	0.997	1.272
32	0.716	0.98	1.254
33	0.7	0.963	12.366
34	0.684	0.946	1.218
35	0.668	0.928	1.199
36	0.651	0.91	1.18
37	0.634	0.891	1.16
38	0.615	0.872	1.139
39	0.595	0.851	1.117
40	0.573	0.828	1.093

Table 6: MCA-PI values according to gestational age

GA (exact week)	MCA-PI Centile								
	3rd	5th	10th	25th	50th	75th	90th	95th	97th
20	1.23	1.25	1.32	1.42	1.57	1.70	1.97	2.09	2.20
21	1.20	1.22	1.29	1.40	1.56	1.70	1.97	2.08	2.19
22	1.19	1.22	1.29	1.41	1.58	1.73	2.00	2.12	2.23
23	1.21	1.25	1.32	1.45	1.63	1.79	2.06	2.19	2.30
24	1.24	1.28	1.36	1.50	1.69	1.86	2.14	2.27	2.39
25	1.27	1.32	1.40	1.55	1.75	1.94	2.22	2.36	2.48
26	1.30	1.35	1.44	1.60	1.82	2.01	2.30	2.45	2.57
27	1.32	1.39	1.48	1.65	1.88	2.08	2.37	2.53	2.65
28	1.34	1.41	1.50	1.68	1.92	2.14	2.43	2.60	2.72
29	1.34	1.41	1.51	1.70	1.95	2.19	2.48	2.65	2.77
30	1.33	1.40	1.51	1.71	1.96	2.21	2.50	2.68	2.80
31	1.30	1.38	1.49	1.69	1.96	2.21	2.50	2.69	2.80
32	1.25	1.33	1.44	1.65	1.93	2.19	2.48	2.67	2.78
33	1.18	1.27	1.38	1.60	1.87	2.15	2.43	2.62	2.73
34	1.10	1.19	1.30	1.52	1.80	2.08	2.35	2.55	2.66
35	1.00	1.10	1.21	1.42	1.70	1.98	2.25	2.45	2.55
36	0.90	0.99	1.10	1.31	1.59	1.87	2.13	2.32	2.43
37	0.78	0.87	0.97	1.18	1.45	1.73	1.98	2.17	2.27

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As CPR is calculated by ratio of umbilical artery pulsatile index to middle cerebral artery pulsatile index with reference values as shown below to the respective gestational age.

Table 7: Different percentile charts of MCA/UA or CPR from 24-40 weeks gestation

Gestational Age	MCA PI/UA-PI (CPR)			
	5th centile	10th centile	50th centile	95th centile
24-26	0.84	0.95	1.83	2.86
27-29	0.477	0.9	1.73	2.68
30-32	0.77	0.89	1.53	2.64
33-35	0.76	0.89	1.5	2.56
36-38	0.64	0.83	1.59	2.55
39-40	0.61	0.8	1.56	2.52

Cerebroplacental ratio (CPR) has been studied and suggested as the most efficient vascular index to detect the fetal redistribution patterns.(42-45) Efficient detection of fetal blood flow redistribution as a predictor of adverse perinatal outcome requires the threshold value of CPR, to determine if it is pathologic or normal. Previous studies found a fixed(< 1.08 MoM) cut-off for the CPR value in pregnancy.(13,14) Other studies established CPR reference ranges in their healthy pregnant mothers and fetal population, and defined the weekly CPR value below the 10th or 5th percentile as a threshold cut-off indicator of pathology.5,15 Many CPR reference ranges have been published from different geographic regions. A recent meta-analysis found considerable variation between these CPR reference ranges, which has important implications for clinical practice(16).

Reduced fetal growth rate is strongly associated with an abnormal cerebroplacental ratio (CPR).[15] In contrast, if the CPR is normal, even in the setting of abnormal umbilical artery Doppler findings, fe¬tuses grow at a rate similar to that of fetuses with normal umbilical artery findings.46] CPR is emerging as a marker of failure to reach growth potential near term. It was reported that fetal low CPR regardless of the fetal size was independently associated with the need for operative delivery for presumed fetal compromise and with neonatal unit admission[47,48] .If CPR is truly a marker of failure to reach growth potential, it would be expected to reflect impaired fetal growth velocity.

Third-trimester studies in selected high-risk pregnancies have reported that low cerebroplacental ratio, due to high pulsatility index in the umbilical artery, and or decreased pulsatility index in the fetal middle cerebral artery, is associated with increased risk of adverse perinatal outcomes. 23

An abnormal CPR may result from 3 types of Doppler measurement patterns. The first is when the UA and MCA PI are in the upper and lower range of the distribution curve, resulting in an abnormally low CPR . The second is when the UA PI is normal but the MCA PI is decreased, resulting in an abnormally low CPR .13 The third pattern consists of an abnormally elevated UA PI and an abnormally decreased MCA PI, resulting in an abnormally low CPR.

Ductusvenosus (DV) Doppler:

It is the parameter that, by itself, has the greatest capacity to predict the risk of stillbirth in early onset IUGR. The absent/reverse flow during atrial contraction is associated with increased perinatal mortality, regardless of gestational age [42], with a risk ranging from 40 to 100% in the cases of early onset IUGR [43].

Aortic isthmus (AoI) Doppler:

It is associated with an increase in fetal mortality and neuro-logical morbidity in the cases of early onset IUGR. This vessel reflects the balance between cerebral impedance and the systemic vascular system [44]. Longitudinal studies show that alterations in AoI precede those of DV in 1 week [45] and, therefore, it is not a good predictor of short-term stillbirth risk. In contrast, AoI seems to improve the prediction of neurological morbidity [46].

Cardiotocography (CTG):

It provided with new knowledge about the patho-physiology and management of IUGR. It evaluates the short-term variability (STV) of fetal heart rate, a parameter that cannot be subjectively evaluated.Computarised CTG is sensitive for the detection of advancedfetal impairment, and that provides a value similar to that of DV with a reverse atrial flow for the prediction of short-term fetal death. A low variability of fetal heart rate is correlated with the

presence of acidosis and severe hypoxia, a fact that has been demonstrated with cord blood collected at the time of cesarean section. Despite the high implementation of conventional CTG in all clinical control protocols, it has not been shown to reduce mortality in high-risk pregnancies given its high inter- and intra-observer variability in interpretation [47].

The aim of this study was to determine the gestational age–specific reference levels of the CPR on the prediction of adverse perinatal outcomes in cases of FGR compared with the use of categorical thresholds. Even when corrected for fetal size and growth velocity, low cerebroplacental ratio remains significantly associated with operative delivery for fetal compromise. This suggests that cerebroplacental ratio is a potentially useful tool for the identification of at risk foetuses.

Hence, the present study finds the association of outcome of pregnancy in patients having altered CPR.

AIMS AND OBJECTIVE OF THE STUDY:

Primary objective:

- To investigate the role or efficacy of cerebroplacental ratio as a marker of reduced fetal growth rate.

Secondary objective:

- To establish relationship between cerebro placental ratio at term, reduced fetal growth velocity and adverse pregnancy outcome

REVIEW OF LITERATURE:

Morales-Roselló J et.al, study done on Fetal Doppler changes as a marker of failure to reach growth potential at term in 2014 found that 11 576 term fetuses, with 8645 (74.7%) classified as AGA. Within the AGA group, fetuses with lower BW had significantly higher UA PI, lower MCA PI and lower CPR MoM values. Large for gestational age (LGA) fetuses were considered as the group least likely to be growth restricted. The CPR MoM< 5^{th} centile (0.6765 MoM) in these fetuses was used as a threshold for diagnosing FRGP. Using this definition, in the AGA pregnancies the percentage of fetuses with FRGP was 1% in the 75–90^{th} BW centile group, 1.7% in the 50–75^{th} centile group, 2.9% in the 25–50^{th} centile group and 6.7% in the 10–25^{th} centile group[47].

Prior T.et.al,study done on Prediction of intrapartumfetal compromise using the cerebroumbilical ratio: a prospective observational study in 2013 found that Infants delivered by cesarean section for fetal compromise had significantly lower cerebroumbilical ratios than those born by spontaneous vaginal delivery (1.52 vs 1.82, P ≤ .001). Infants with a cerebroumbilical ratio <10th percentile were 6 times more likely to be delivered by cesarean section for fetal compromise than those with a cerebroumbilical ratio ≥10th percentile (odds ratio, 6.1; 95% confidence interval, 3.03-12.75). A cerebroumbilical ratio >90th percentile appears protective of cesarean section for fetal compromise (negative predictive value 100%)[49].

Khalil A, et al. Value of third-trimester cerebroplacental ratio and uterine artery Doppler indices as predictors of stillbirth and perinatal loss in 2016 found that. EFW centile and UtA mean pulsatility index (UtA-PI) MoM, CPR-MoM remained an independent predictor of stillbirth (odds ratio (OR) = 0.003 (95% CI, 0.00-0.11), P = 0.003) and perinatal mortality (OR = 0.001 (95% CI, 0.00-0.03), P < 0.001). UtA-PI ≥ 1.5 MoM was significantly

associated with low CPR-MoM, even after adjusting for EFW centile (OR = 5.22 (95% CI, 3.88-7.04), P < 0.001) or small-for-gestational age (SGA; OR = 4.73 (95% CI, 3.49-6.41), P < 0.001).

These associations remained significant, even when excluding pregnancies with SGA or including only cases in which Doppler indices were recorded at term (P < 0.01). For prediction of stillbirth, the area under the ROC curve, using a combination of these three parameters, was 0.88 (95% CI, 0.77-0.99) with a sensitivity of 66.7%, specificity of 92.1%, positive likelihood ratio (LR) of 8.46 and negative LR of 0.36.Third-trimester CPR is an independent predictor of stillbirth and perinatal mortality[6].

Flood K, et al. The role of brain sparing in the prediction of adverse outcomes in intrauterine growth restriction: results of the multicenter PORTO Study in 2014 found that CPR calculation was available in 881 cases,which was performed at a mean gestational age of 33 weeks (interquarile range ,28.7 -35.9). Of the 146 cases with CPR less than 1,18%(n=27) had an adverse perinatal outcome.This conferred an 11-fold increased risk (odds ratio,11.7;p<0.0001) when compared with cases with normal CPR (2% ; 14 OF 735).An abnormal CPR was present n all 3 cases of mortality.Prediction of adverse outcome was comparable when using all definitions of abnormal Doppler[7].

Nassr AA, et.al, Fetal cerebro-placental ratio and adverse perinatal outcome: systematic review and meta-analysis of the association and diagnostic performance in 2016 found that Seven studies were eligible (1428 fetuses). Fetuses with abnormal CPR were at higher risk of CS for fetal distress (OR=4.49, 95% CI [1.63, 12.42]), lower APGAR scores (OR=4.01, 95% CI [2.65, 6.08]), admission to NICU (OR=9.65, 95% CI [3.02, 30.85]), and neonatal complications (OR=11.00, 95% [3.64, 15.37]) than fetuses who had normal CPR. These risks were higher among studies that included fetuses diagnosed with FGR than fetuses

at risk of FGR. Abnormal CPR had higher diagnostic accuracy for adverse perinatal outcomes among "sonographically diagnosed FGR" studies than "at risk of FGR" studies[8].

DeVore GR. The importance of the cerebroplacental ratio in the evaluation of fetal well-being in SGA and AGA foetuses in 2015 found that Fetuses with an abnormal CPR that are appropriate for gestational age or have late-onset SGA (>34 weeks of gestation) have a higher incidence of fetal distress in labor requiring emergency cesarean delivery, a lower cord pH, and an increased admission rate to the newborn intensive care unit when compared with fetuses with a normal CPR. Fetuses with early-onset SGA (<34 weeks of gestation) with an abnormal CPR have a higher incidence of the following when compared with fetuses with a normal CPR: (1) lower gestational age at birth, (2) lower mean birthweight, (3) lower birthweight centile, (4) birthweight less than the 10th centile, (5) higher rate of cesarean delivery for fetal distress in labor, (6) higher rate of Apgar scores less than 7 at 5 minutes, (7) an increased rate of neonatal acidosis, (8) an increased rate of newborn intensive care unit admissions, (9) higher rate of adverse neonatal outcome, and (10) a greater incidence of perinatal death[50].

Martin et al. reported that increased uterine Doppler PI at 11 to 14 weeks have sensitivity of 11.7% for detecting birth weightless than the 10thpercentile, and 27.8% for FGR requiring delivery by 32weeks gestation[44]. Others have reported sensitivities of 24% and 16%[46]. Despite these low sensitivities, women with a high uterine artery mean RI (greater or equal to the 75th percentile) are 5.5 times more likely to have an FGR pregnancy [36]. In the second trimester, a multicentre study of about 8000 women, using a PI above the 95th percentile(1.63) reported higher sensitivities if FGR was defined by the 5th compared to the 10th percentile (19%versus 16%)[87].In FGR requiring delivery prior to 32 or 34 weeks, sensitivities of 56% and 70% have been reported, respectively [47]. Newer studies have

attempted to add maternal factors and serum biochemistry such as PAPPA in order to increase detection rates. Unfortunately, sensitivities remain unremarkable [48]. There are also technical concerns with reproducibility, especially in the first trimester. The role of uterine artery Doppler in established FGR and in the third trimester is limited.Doppler assessment of the uterine artery is a work in progress and more studies are warranted to define its role in screening for FGR

Ferrazzi et al.conducted an observational study in a tertiary care/teaching hospital on FGR foetuses before 32weeks'gestation to compare Doppler changes as a function of time. Delivery was based on a non reactive fetal heart rate tracing and not on Doppler information. Firstly, for each vessel there was a progressive increase in the percent of fetuses developing a Doppler abnormality. Secondly, severely FGR foetuses followed a progressive sequence of acquiring Doppler abnormalities, which were categorized into "early" and "late" Doppler changes. Early changes occurred in peripheral vessels (umbilical and middle cerebral arteries; 50% of patients affected15-16 days prior to delivery). Late changes included umbilical artery reverse flow, and abnormal changes in the DV aortic and pulmonary out flow tracts(50%of patients affected 4-5 days prior to delivery).The time interval between the occurrence of early and late changes was significantly different. Late changes in vascular adaptation by the severely growth-restricted fetus are the best predictor of perinatal death[67].

MATERIAL AND METHODS

Study Design: A prospective observational study.

Source of data: 200 women attended Obstetrics and Gynecology (Outpatient and inpatient) department at BLDE (DEEMED TO BE UNIVERSITY) Shri B. M. Patil Medical College, Hospital & Research Centre.

Period of study: The study was conducted during the period of Nov 2018 to May 2020.

Setting: During the regular Antenatal check up ,first visit in early pregnancy patients were subjected for dating scan or if patients had already the daying scan they were also recruited for the study , and those were further followed at 20 -25 weeks period of gestation for Abdominal Circumference(AC) and Estimated Fetal Weight (EFW).Then further followed at >35 weeks period of gestation for AC,EFW and Doppler studies (Middle Cerebral Artery Pulsatile index and Umbilical Artery Pulsatile Index)

Participants: Informed consent was taken from each women .relevant obstetric history including detailed history of ante natal visits and associated signs and symptoms of the condition which causes IUGR number of scans, blood investigation and treatment taken.

A.Inclusion criteria:

- Singleton pregnancies above 20 weeks period of gestation, High risk pregnancies with Dating scan .

B.Exclusion criteria:

- Multiple pregnancy
- Congenital anomalies of the foetus
- Patient not having dating and anomaly scan.

Method of collection of data

Gestational age was calculated from the crown-rump length measurement at 11-13 weeks of gestation and fetal biometry i.e AC was performed at 20-25 weeks period of gestation. AC is measured on a transverse section at the level of bifurcation of main portal vein into the right and left branches. Stomach bubble should be visible and abdomen should occupy more than half of the total image. Kidneys should not be visible in the plane taken for AC measurement .Again USG done at or more than 35weeks period of gestation, AC was noted, doppler study was done according to a standard protocol and the estimated fetal weight calculated using Fetal parameters like biparietal diameter (BPD), head circumstances (AC) and femur length, and these parameters are combined to calculate estimated fetal weight (EFW) using HADLOCK'S formulae. The umbilical artery and middle cerebral artery Doppler waveforms was recorded using Colour Doppler, and the pulsatility index (PI) was calculated according to standard protocols. In brief the middle cerebral artery PI values was obtained in the space where the artery passes by the sphenoid wing close to the Circle of Willis, and umbilical artery PI values was obtained from one of the umbilical arteries in a free loop of umbilical cord. When three similar consecutive waveforms were obtained, the PI was measured. The measurements was obtained in the absence of fetal movement, keeping the insonation angle with the examined vessels at less than 30^{o}. The cerebro-placental ratio (CPR) was calculated as the simple ratio between the middle cerebral artery PI and the umbilical artery PI.

Intrapartum data was included whether the labor is induced or spontaneous, presence or absence of meconium stained liquor (grade 2 or 3), cardiotocograph abnormalities (classified according to National Institute for Health and Care Excellence guidelines), use of oxytocin for slow progress of labor, intrapartum pyrexia, intrapartumhemorrhage, use of epidural analgesia for labor and mode of delivery.

Data on maternal baseline characteristics and pregnancy outcomes was collected from hospital obstetric and neonatal records. The adverse pregnancy outcome includes operative delivery for presumed fetal compromise and admission to the Neonatal Intensive Care Unit. Operative delivery includes both cesarean section and instrumental delivery. The diagnosis of fetal compromise was based on cardiotocograph abnormalities.

Sample size:

With odds ratio of SGA 3.6 and prevalence of SGA 31%[10] at 99% CI,a relative precision of 50% the sample size was calculated was 125 using formula.

$$n_a = [Z_{\alpha/2}^2 / \log^2(1\text{-}RP)] * [1/X + 1/Y]$$

where,

$X = 1 / \rho_p(1-\rho_p)k$, and

$Y = 1 / \rho_a(1-\rho_a)$

Calculated minimum sample size was 125

Drop out rate 10% of 125 equal to 13

Therefore, 125 + 13 =138 patients were included in the study.

Here , we have included 200 patients in our study.

Statistical analysis

All characteristics were summarized descriptively. For continuous variables, the summary statistics of mean± standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries and diagrammatic presentation. Chi-square (χ^2) test was used for association between two categorical variables.

The formula for the chi-square statistic used in the chi square test is:

$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

The subscript "c" are the degrees of freedom. "O" is observed value and E is expected value.

C= (number of rows-1)* (number of columns-1)

The difference of the means of analysis variables between two independent groups was tested by unpaired t test.

The t statistic to test whether the means are different can be calculated as follows:

$$t = \frac{(\overline{x_1} - \overline{x_2}) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

where $\bar{x}_1$ = mean of sample 1

$\bar{x}_2$ = mean of sample 2

n_1 = number of subjects in sample 1

n_2 = number of subjects in sample 2

s_1^2 = variance of sample 1 = $\frac{\Sigma(x_1 - \bar{x}_1)^2}{n_1}$

s_2^2 = variance of sample 2 = $\frac{\Sigma(x_2 - \bar{x}_2)^2}{n_2}$

The difference of the means of analysis variables between more than two independent groups was tested by ANOVA and F test of testing of equality of Variance.

ANOVA

Source	d.f.	SS	MS	F
Treatment	$a-1$	SS_{treat}	$\frac{SS_{treat}}{a-1}$	$\frac{MS_{treat}}{MS_{error(a)}}$
Error (a)	$N-a$	$SS_{error(a)}$	$\frac{SS_{error(a)}}{N-a}$	
Time	$t-1$	SS_{time}	$\frac{SS_{time}}{t-1}$	$\frac{MS_{time}}{MS_{error(b)}}$
Treat x Time	$(a-1)(t-1)$	$SS_{treat\ x\ time}$	$\frac{SS_{treat\ x\ time}}{(a-1)(t-1)}$	$\frac{MS_{treat\ x\ time}}{MS_{error(b)}}$
Error (b)	$(N-a)(t-1)$	$SS_{error(b)}$	$\frac{SS_{error(b)}}{(N-a)(t-1)}$	
Total	$Nt-1$	SS_{total}		

The sources of the variation include treatment; Error (a); the effect of Time; the interaction between time and treatment; and Error (b). Error (a) is the effect of subjects within treatments and Error (b) is the individual error in the model. All these add up to the total.

Linear regression was used for predictive analysis. These regression estimates are used to explain the relationship between one dependent variable and one or more independent variables. A linear regression line has an equation of the form Y = a + bX, where X is the explanatory variable and Y is the dependent variable. The slope of the line is b, and a is the intercept (the value of y when x = 0).

If the p-value was < 0.05, then the results were considered to be statistically significant otherwise it was considered as not statistically significant. Data were analyzed using SPSS software v.23 (IBM Statistics, Chicago, USA)and Microsoft office 2010.

RESULTS:

We recruited 200 pregnant women in our study to find the efficacy of Cerebro Placental Ratio (CPR) as a predictor of fetal growth restriction and association of low CPR with adverse fetal and maternal outcome.

The analysis of which were 135 cases of AGA , 63 cases were SGA and 2 cases were LGA . All characteristics were summarized descriptively. For continuous variables, the summary statistics of mean± standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries and diagrammatic presentation. Chi-square (χ^2) test was used for association between two categorical variables. Linear regression was used for predictive analysis. These regression estimates are used to explain the relationship between one dependent variable and one or more independent variables

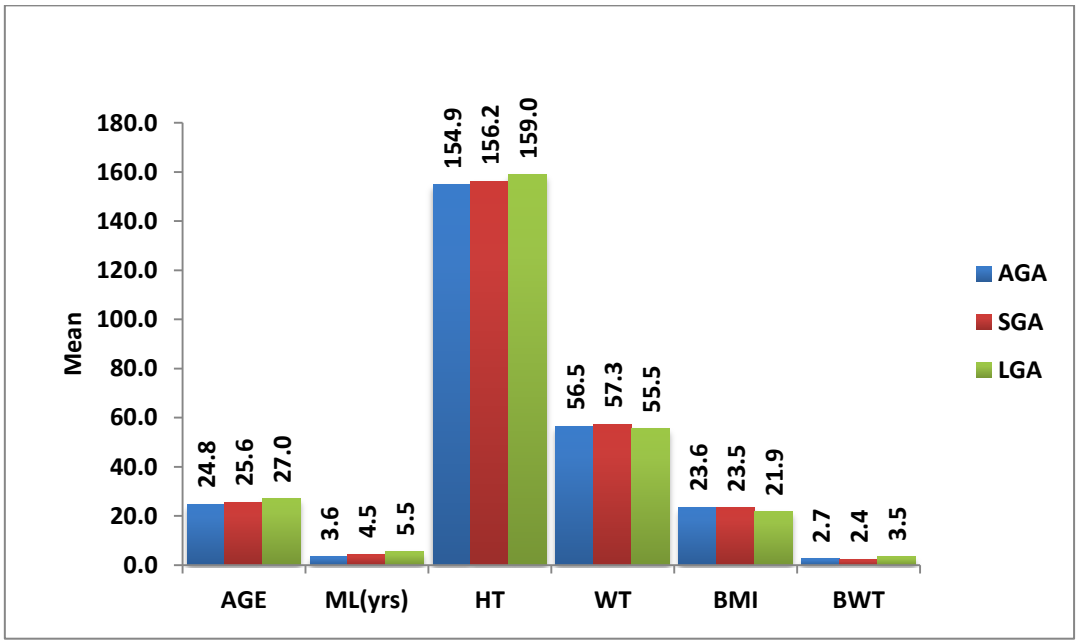
Following are the results by statistical ananlysis of all the cases as per eligible criteria.

Table 8: Distribution of Demographic parameters among AGA, SGA and LGA

Parameters	**AGA**	**SGA**	**LGA**	**p value**
	Mean±SD	**Mean±SD**	**Mean±SD**	
AGE(years)	24.8±4.5	25.6±4.7	27±7.1	0.449
Married life(ML) (yrs)	3.6±3	4.5±3.2	5.5±6.4	0.096
Height(Ht)	154.9±3.8	156.2±5.6	159±5.7	0.084
Weight (Wt)	56.5±6.2	57.3±8	55.5±3.5	0.701
Body Mass Index(BMI)	23.6±2.5	23.5±3.3	21.9±0.2	0.714

Note: * significant at 5% level of significance ($p<0.05$)

Figure 7: Distribution of Demographic parameters among AGA, SGA and LGA

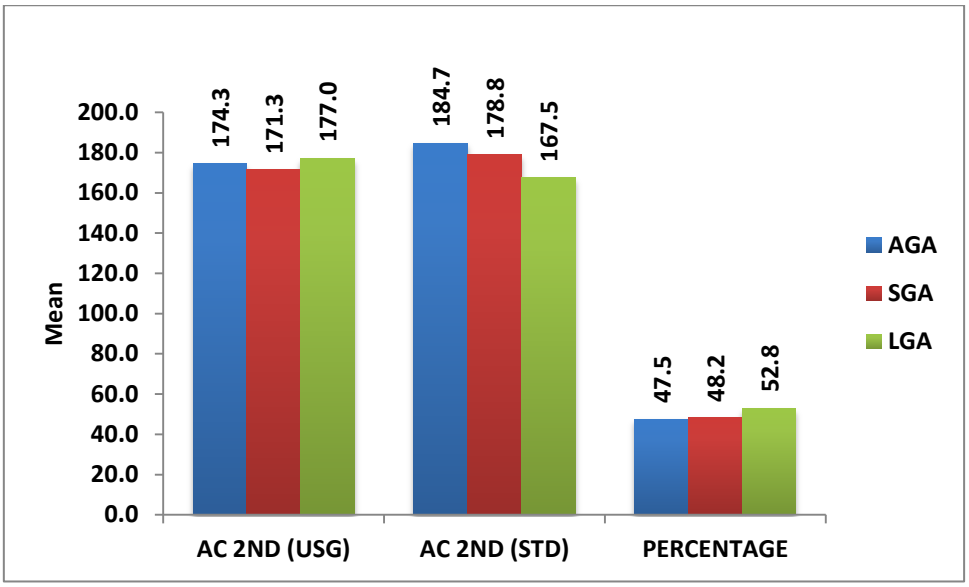


The maternal demographics of 200 pregnancies,which includes Age, Married Life(ML) ,Height(Ht), Weight(Wt) and Body Mass Index(BMI) were compared among AGA,SGA and LGA groups . Of 135 cases of AGA the **Mean±SD** of age were 24.8±0.45, married life was 3.6±3 years with the height 154.9±3.8cm, weight 56.5±6.2kg and BMI 23.6±2.5 kg/m2 . Among SGA cases **Mean±SD** of age were 25.6±4.7 in years , married life in 4.5±3.2 years with the height 156.2±5.6cm, weight 57.33±8kg and BMI 23.5±3.3 kg/m2 . With LGA **Mean±SD** of age were 27±7.1, married life in 5.5±6.4 years with the height 159±5.7cm, weight 55.5±3.5kg and BMI 21.9±0.2 kg/m2. The demographic parameters of SGA,LGA and AGA were comparable in all aspects.

Table 9: Distribution of 2nd trimester Abdominal Circumference (AC)_among AGA,SG and LGA

Parameters	AGA	SGA	LGA	p value
	Mean±SD	Mean±SD	Mean±SD	
2ND TRIMESTER (USG) AC in mm	174.3±24.4	171.3±31.6	177±19.8	0.762
2NDTRIMESTER(50th percentile) AC in mm	184.7±18.7	178.8±17.8	167.5±7.8	0.058
PERCENTILE	47.5±7	48.2±9.1	52.8±3.5	0.541

Figure 8: Distribution of 2nd Trimester AC according to AGA, SGA and LGA



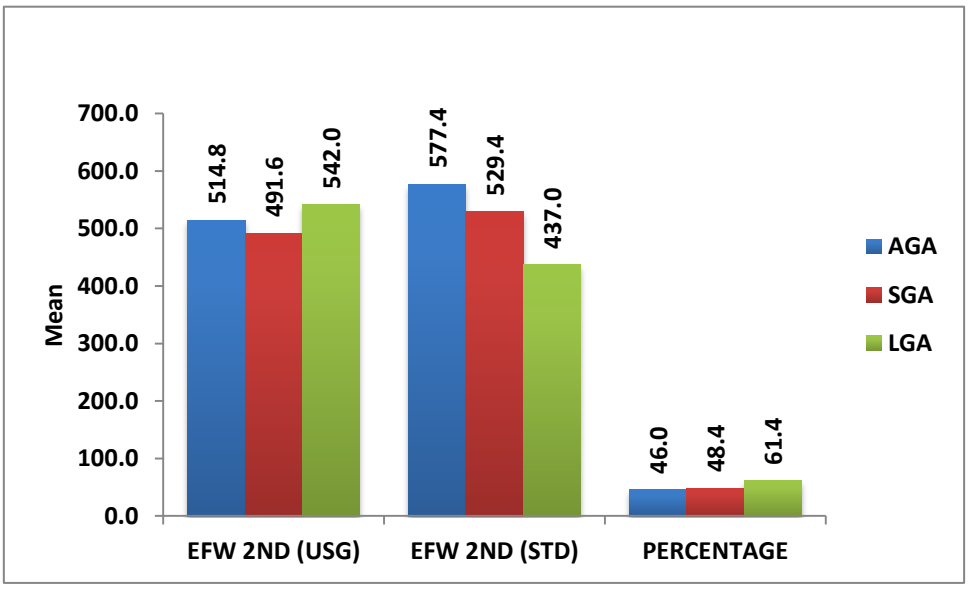
The **Mean±SD of** 2nd trimester Abdominal circumference values by USG of AGA foetuses were 174.3±24.4mms, SGA foetus were 171.3±31.6mms and LGA foetuses were 177±19.8mms . When these were compared to 50th percentileof 2nd trimester AC the difference in Mean between 3 groups were noted but the difference was not statistically significant.

Table 10: Distribution of Estimated Fetal Weight (EFW) during 2nd Trimester ultrasonography according to AGA,SGA and LGA .

Parameters	AGA	SGA	LGA	p value
	Mean±SD	Mean±SD	Mean±SD	
2ND TRIMESTER (USG) EFW IN Grams	514.8±151	491.6±141	542±152.7	0.558
2ND TRIMESTER (50TH Percentile) EFW in Grams	577.4±148.1	529.4±132.7	437±55.2	0.044*
PERCENTILE	46±12.7	48.4±15.4	61.4±9.7	0.166

Note: * significant at 5% level of significance (p<0.05)

Figure 9: Distribution of EFW during 2nd trimester ultrasonography according to SGA,AGA and LGA .

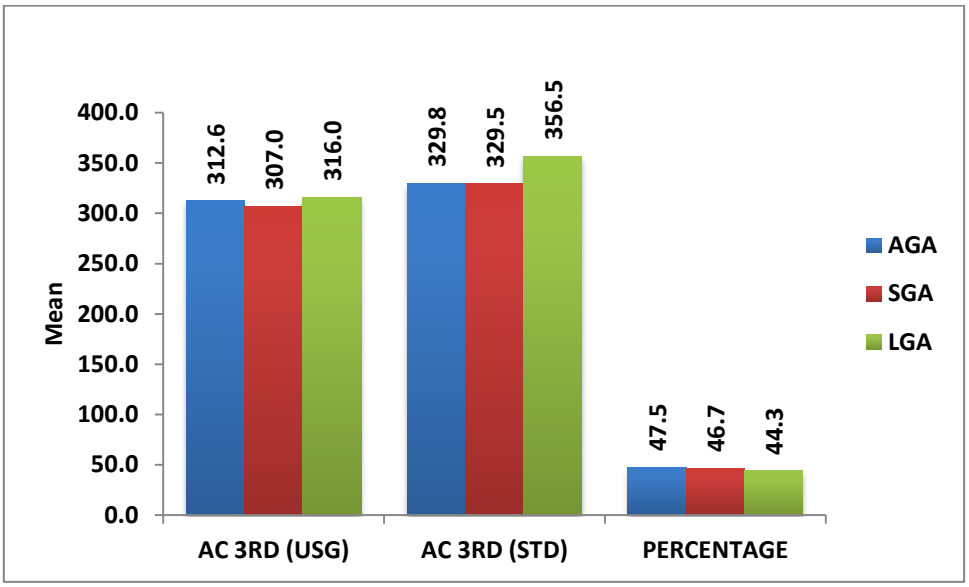


The **Mean±SD of** 2nd trimester EFW by USG of AGA foetuses were 514.8±151grams , SGA foetuses were 491.6±141 grams and LGA foetuses were 542±152.7 grams . When these were compared to 50th percentile of 2ND trimester EFW the difference between 3 groups ,AGA and SGA the EFW were less where as LGA the EFW were more and they were statistically significant with p =0.04.

Table 11: Distribution of 3rd Trimester AC among SGA,AGA and LGA

Parameters	AGA(135)	SGA(63)	LGA(2)	p value
	Mean±SD	Mean±SD	Mean±SD	
3rd TRIMESTER (USG) AC in mm	312.6±30.5	307±28.9	316±21.2	0.464
3rd TRIMESTER(50th percentile) AC in mm	329.8±16.8	329.5±18.9	356.5±9.2	0.1
PERCENTILE	47.5±4.8	46.7±4.3	44.3±1.8	0.351

Figure 10: Distribution of 3rd Trimester AC according to SGA, AGA and LGA



The Mean ± SD of 3rd Trimester Abdominal circumference by USG of AGA foetuses were 312.6±30.5 mms ,SGA foetuses were 307±28.9 mms & LGA foetuses were 316±21.2mms with P value 0.464 .When compared to 50th percentiles of 3rd Trimester AC

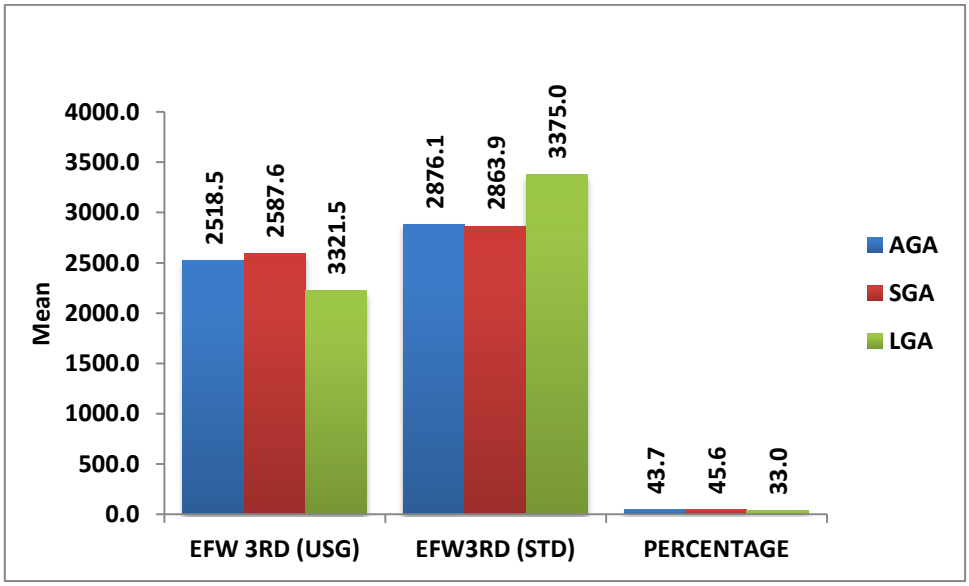
among AGA,SGA& LGA the AC's were less and the difference were not statistically insignificant.

Table 12: Distribution of 3rd TRIMESTER EFW among SGA,AGA and LGA

Parameters	AGA(135)	SGA(63)	LGA(2)	p value
	Mean±SD	Mean±SD	Mean±SD	
3rd TRIMESTER (USG) EFW IN Grams	2518.5±575.2	2587.6±450.3	3321.5±334.5	0.497
3rd TRIMESTER (50TH Percentile) EFW in Grams	2876.1±335.7	2863.9±377.2	3375±123	0.127
PERCENTILE	43.7±8.2	45.6±7.8	33±6.2	0.046*

Note: * significant at 5% level of significance (p<0.05)

Figure 11: Distribution of 3rd TRIMESTER EFW according to FGR



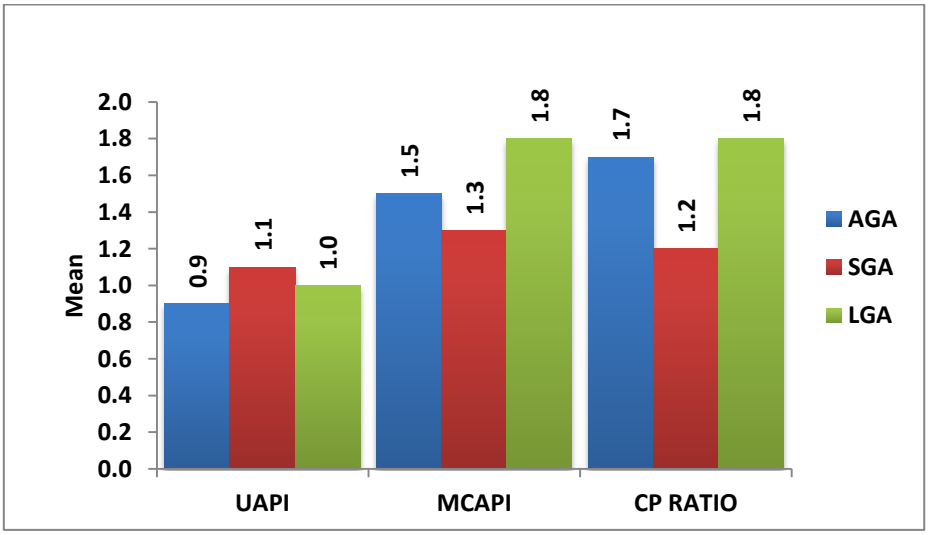
The Mean ± SD of 3ND Trimester EFW by USG of AGA foetuses were 2518.5±575.2 grams ,SGA foetuses were 2587.6±450.3 grams & LGA foetuses were 3321.5±334.5grams , with P value 0.497 .When compared to 50th percentile of 3rd Trimester EFW the difference between 3 groups of EFW were noted and the difference was statistical significant with p = 0.04.

Table 13: Distribution of UAPI, MCAPI AND CPR parameters according to SGA, AGA and LGA

Parameters	AGA(135)	SGA(63)	LGA(2)	p value
	Mean±SD	Mean±SD	Mean±SD	
UAPI	0.9±0.2	1.1±0.2	1±0.1	<0.001*
MCAPI	1.5±0.2	1.3±0.2	1.8±0.1	<0.001*
CP RATIO	1.7±0.5	1.2±0.1	1.8±0	<0.001*

Note: * significant at 5% level of significance (p<0.05)

Figure 12: Distribution of UAPI, MAAPI AND CPR parameters according to FGR



The Mean ±SD of Umbilical Artery Pulsatile Index (UA PI)of AGA were 0.9±0.2, SGA were 1.1±0.2 and LGA were 1±0.1 with p value <0.001.The Mean ±SD of Middle Cerebral Artery Pulsatile Index (MCA PI)of AGA were 1.5±0.2,SGA were 1.3±0.2 and LGA were 1.8±0.1 with p value <0.001.The Mean ±SD of Cerebro-Placental Ratio(CPR) with respect to AGA were 1.7±0.5,1, SGA were 1.2±0.1 , LGA were 1.8±0 with p value <0.001 which was statistically significant .

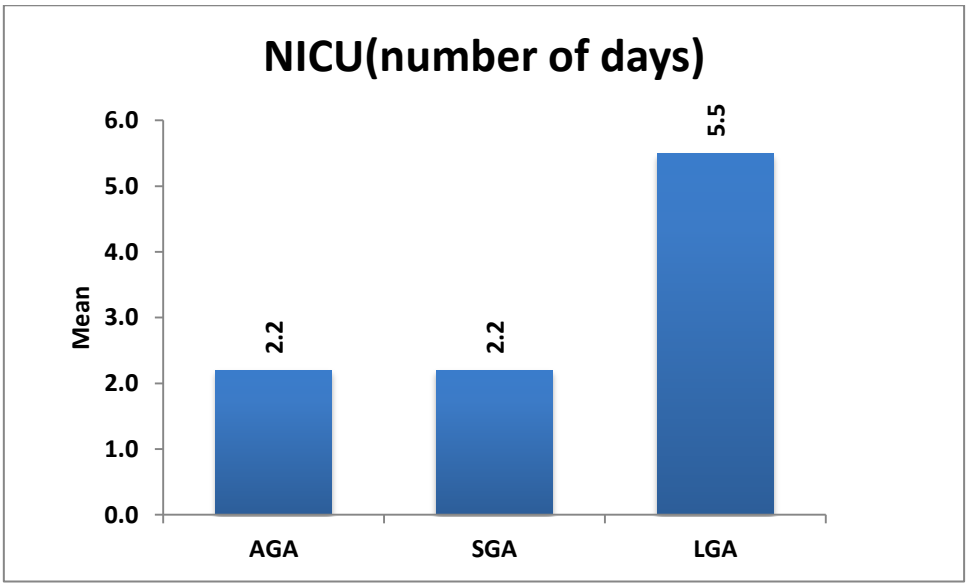
Table 14: Distribution of NICU admission among Low CPR and Normal CPR

Parameters	**Normal CPR(125)**	**Low CPR(75)**	**P value**
NICU (No.of days)	**64 (51.2%)**	**40(53.3%)**	**0.77**

Table 15: Distribution of NICU days according to SGA, AGA and LGA

Parameters	**AGA(135)**	**SGA(63)**	**LGA(2)**	**p value**
	Mean±SD	**Mean±SD**	**Mean±SD**	
NICU(number of days)	2.2±2.9	2.2±3.2	5.5±0.7	0.305

Figure 13: Distribution of NICU days according to SGA, AGA and LGA



Among all 200 patients we found the Mean ± SD of NICU admission (days) of AGA were 2.2±2.9 days , SGA were 2.2±3.2 days & LGA were 5.5±0.7 days with P value 0.305 which was not statistically significant.

Table 16: Distribution of mode of delivery among AGA , SGA and LGA.

Parameters	**AGA(135)**		**SGA(63)**		**LGA(2)**		**p value**
	N	**%**	**N**	**%**	**N**	**%**	
FTND	87	64.4%	40	63.5%	2	100.0%	0.569
LSCS	48	35.6%	23	36.5%	0	0.0%	0.569

Of 135AGA cases, 87 cases (64.4%) were vaginal delivery and 48 cases (35.6%) were cesearean delivery .In SGA (63)cases 40 cases (63.5%) were vaginal delivery and 23(36.5%) cases were cesearean delivery.Among 2 LGA cases both were cesearean delivery ,the difference among them were noted but not statistically significant.

Table 17: Distribution of APGAR score at 5 minutes (<7)

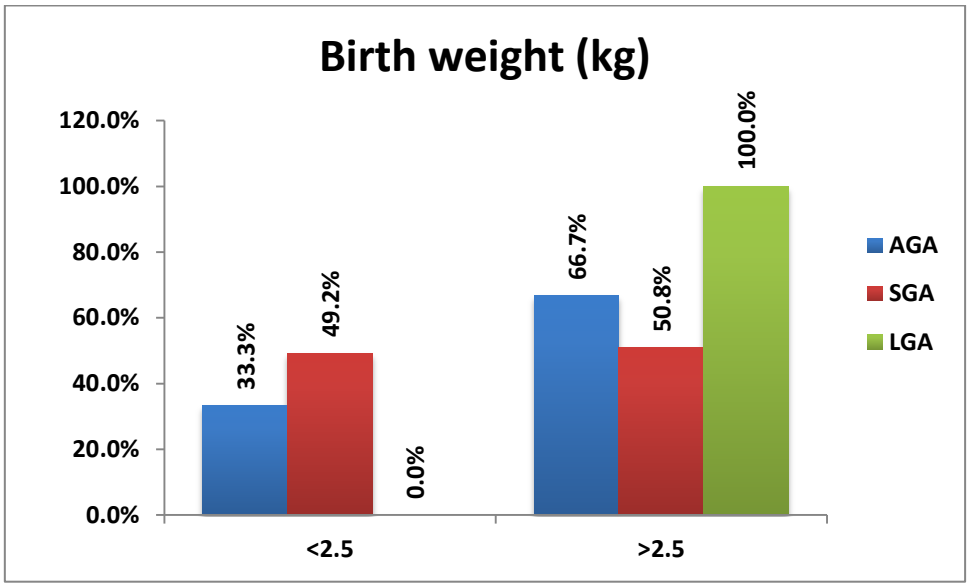
	Normal CPR	LOW CPR	p VALUE
APGAR SCORE(<7) at 5 min	1	3	<0.056

Above data reveals that among normal CPR (125) cases only 1 case had APGAR score < 7 at 5 min and of low CPR(75) Cases were 3 had APGAR score < 7 at 5 min and difference among them were noted and were not statistically significant p<0.054.

Table 18: Distribution of Birth Weight among AGA, SGA and LGA.

BWT(kg)	AGA(135)		SGA(63)		LGA(2)		p value
	N	%	N	%	N	%	
<2.5	45	33.3%	31	49.2%	0	0.0%	
>2.5	90	66.7%	32	50.8%	2	100.0%	0.054
Total	135	100.0%	63	100.0%	2	100.0%	

Figure 14: Distribution of Birth Weight according to AGA, SGA and LGA



Two hundred participants after subjecting them to ultrasonography and Doppler studies there were about 135 (AGA), 63 (SGA), 2 (LGA) .Out of 135 cases AGA, 90 cases (66.7%) were >2.5 kg of birth weight, and 45 cases (33.3%) had birth weight of < 2.5 kg.

In 63 SGA cases 31 (49.2%) cases had birth weight < 2.5 kg and 32 (50.8%) cases had birth weight >2.5 kg and LGA 2 (100%)cases the birth weight >2.5 kg .Comparing of birth weight among all the group was not statistically significant.

Table 19: Distribution depending on Normal CPR and Low CPR

Parameters		**Normal CPR**		**Low CPR**		**p value**
		N	**%**	**N**	**%**	
FTND		81	64.8%	48	64.0%	0.909
LSCS		44	35.2%	27	36.0%	0.909
BWT cat	<2.5Kg	42	33.6%	34	45.3%	0.098
	>2.5Kg	83	66.4%	41	54.7%	
NICU		64	51.2%	40	53.3%	0.77
Total		125	100.0%	75	100.0%	

Among 125 cases of Normal CPR 81 (64.8%) cases were vaginal delivery and 44 (35.2%) cases were cesearean delivery .of 75 cases of low CPR 48(64%) cases were vaginal delivery and 27 (36%) cesearean delivery difference among them were noted but were noy statistically significant.

Of 125 cases of normal CPR 42 (33.6%) were birth weight of <2.5kg and 83(66.4%) cases were birth weight of >2.5kg. Among low CPR 34 (45.3%) were birth weight of <2.5kg and 40(53.3%) cases were birth weight of >2.5kg the diiference among them were noted but were not statistically significant p=0.098

Among normal CPR 64 (51.2%) cases were had NICU admission and in low CPR 40(53.3%) cases were had NOC admission, the differences among them were noted but were not statistically significant.

Figure 15: Comparison of Normal and low CPR with different parameters

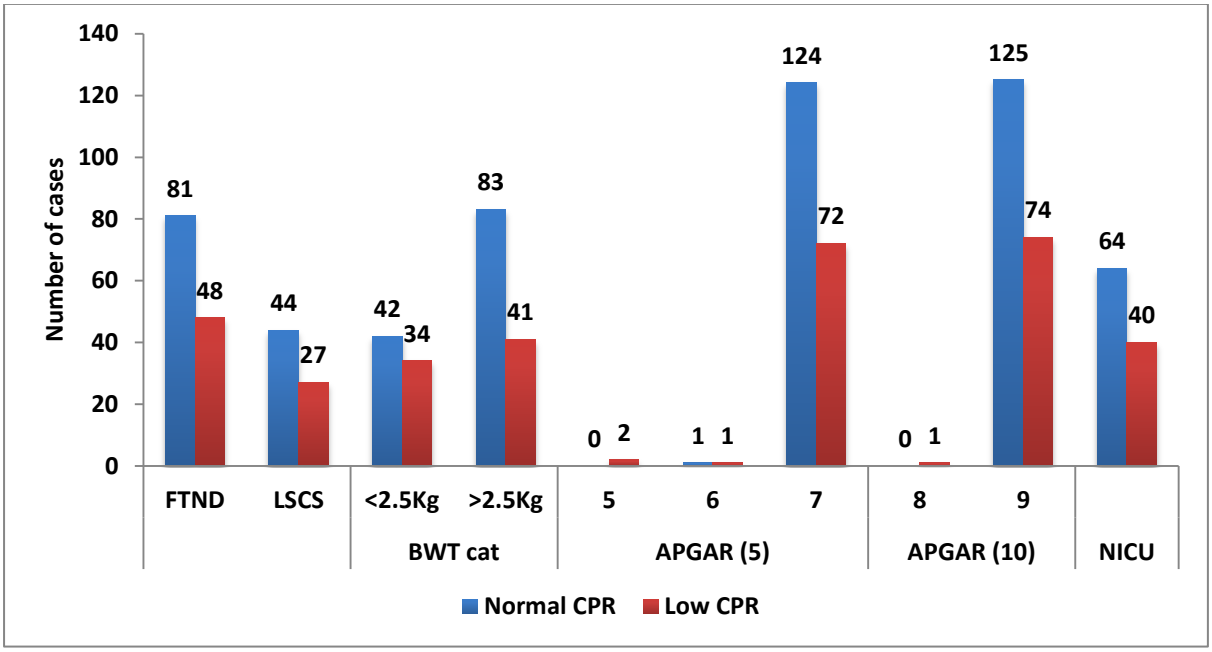


Table 20: Linear regression result of AC of 2nd Trimester (USG) as Dependent variable

Predictors	Regression Coefficient	Std. Error	p value
UAPI	-0.05	8.483	0.996
MCAPI	-4.46	8.905	0.617
BWT	2.47	4.821	0.609
Constant	173.43	18.372	<0.001*

Note: * significant at 5% level of significance (p<0.05)

There was negative linear relationship found between UAPI, MCAPI and AC 2nd trimester (USG) but it was positive with birth weight.

Table 21: Linear regression result of AC 3rd trimester (USG) as Dependent variable

Predictors	**Regression Coefficient**	**Std. Error**	**p value**
UAPI	-5.92	9.08	0.515
MCAPI	-11.99	9.532	0.210
BWT	21.63	5.161	<0.001*
Constant	277.71	19.664	<0.001*

Note: * significant at 5% level of significance (p<0.05)

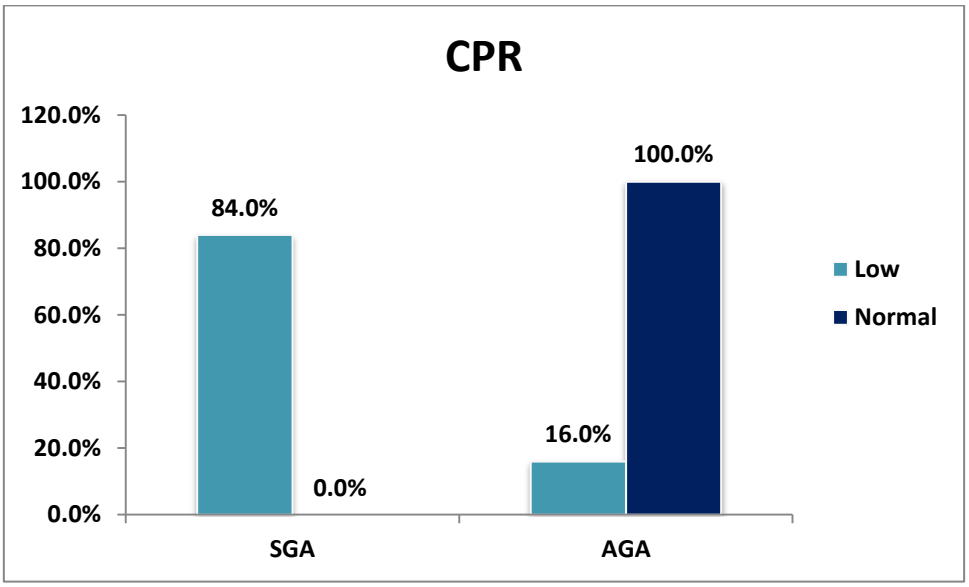
There was negative linear relationship found between UAPI, MCAPI and AC 3rd trimester (USG) but it was positive with birth weight

Table 22: Association of CPR and FGR

CPR	**SGA**		**AGA+LGA**		**p value**
	N	**%**	**N**	**%**	
Low	63	84.0%	12	16.0%	<0.001*
Normal	0	0.0%	125	100.0%	
Total	63	31.5%	137	68.5%	

Note: * significant at 5% level of significance (p<0.05)

Figure16: Association of CPR and FGR



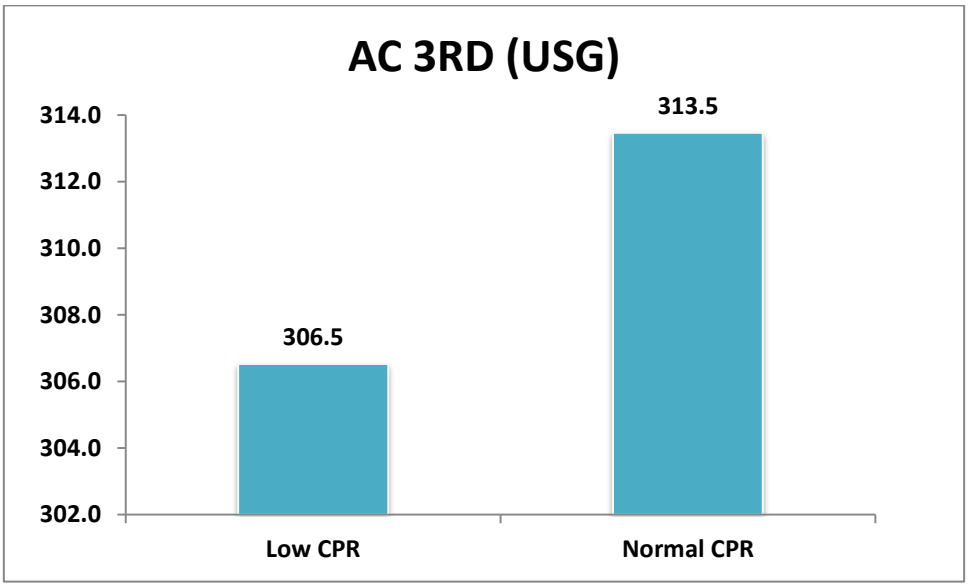
Among the total number of sample (200) ,75 cases were low CPR and 135 cases were normal CPR .Among the low CPR 63 cases from SGA i.e 84 %,12 were from AGA and LGA i.e 16%.Hence the low CPR shows high association with SGA as compared to LGA and AGA at 5% level of significance ($p<0.001$)

Table 23: Distribution of 3rd trimester AC according to CPR

Parameters	**Low CPR**		**Normal CPR**		**p value**
	Mean	**SD**	**Mean**	**SD**	
3RD trimester AC	306.5	17.7	313.5	11.1	0.043*

Note: * significant at 5% level of significance ($p<0.05$)

Figure 17: Distribution of AC 3rd trimester (USG) according to CPR



The **Mean±SD** of AC at 3rd Trimester among low CPR cases (75 cases) were 306.5± 17.7. **Mean±SD of** AC at 3rd Trimester of normal CPR cases (125 cases) is 313.5± 11.1 the differences among them were noted and were statistically significant p of 0.043.

Table 24: Linear regression result of AC 3rd trimester (USG) as Dependent variable

Predictors	**Regression Coefficient**	**Std. Error**	**p value**
CPR	-6.93	4.358	0.049*
Constant	313.46	2.669	<0.001*

Note: * significant at 5% level of significance (p<0.05)

The negative linear relationship was found between CPR and AC 3rd trimester (USG) which was statistically significantly (p<0.05).

Table 25: Maternal demographics, ultrasound parameters and pregnancy outcomes

Variable	Values
Maternal demographics	
Maternal age in years, median (IQR)	24.0 (22.0-28.0)
Body mass index in kg/m^2, median (IQR)	23.0 (21.6-25.5)
Ultrasound parameters	
Gestational age at the second trimester ultrasound in weeks, median (IQR)	23 (22 - 24.6)
Abdominal circumference in mm at 20-24 weeks' gestation, median (IQR)	185 (173- 197)
Abdominal circumference Z score at 20-24 weeks' gestation, median (IQR)	0.06(-0.72 - 0.80)
Gestational age at the third trimester ultrasound in weeks, median (IQR)	37 (36.2 -38.5)
Abdominal circumference in mm in third trimester, median (IQR)	305 (298 -330)
Estimated fetal weight at the third trimester scan in grams, median (IQR)	2564(2154 - 2935)
Umbilical artery pulsatility index (PI), median (IQR)	1 (1 -1)
Middle cerebral artery PI, median (IQR)	1 (1-2)
Cerebroplacental ratio, median (IQR)	1 (1-2)
Interval between the second and third trimester ultrasound scans in weeks, median (IQR)	10.9 (24.5-35.1)
Intrapartum factors	
Induction of labor, n (%)	7 (3.5)
Intrapartum hemorrhage, n (%)	3 (1.5)
Oxytocin used for slow progress, n (%)	199 (99.5)
Meconium grade 2/3, n (%)	12 (6)
Pregnancy outcome	
Birthweight in grams, median (IQR)	2354(1895-3854)
Small for gestational age, n (%)	63 (31.5)
Appropriate for geststional age n(%)	135(67.5)
Large for gestation age (%)	2(1)

Table 26: Results of the univarient logistic regression analysis of variable associated with the need for operative delivery for presumed fetal compromise

Risk factors	Total study population		
	OR	95% CI	P-value
Maternal age (years)	1.02	0.944-1.093	0.015
Body mass index (kg/m^2)	0.94	0.847-1.049	0.059
Gravida	1.10	0.847-1.452	0.122
Induction of labor	1.29	0.221-7.525	0.254
Meconium Liquor	2.43	0.500-11.835	0.89
CTG	1.03	0.167 -6.379	0.032
Postpartum hemorrhage	71.10	0	20.382
Oxytocin use	0.00	0	42.9

Table 27: Results of the univariable logistic regression analysis of variables associated with admission to the neonatal unit

Risk factor	OR	95% CI	P-value
Maternal age (years)	0.99	0.917-1.057	0.670
Body mass index (kg/m^2)	1.01	0.913-1.122	0.822
Gravida	0.97	0.77-1.224	0.802
Induction of labor	0.67	0.108-4.245	0.678
Meconium Liquor	0.88	0.251-3.073	0.835
CTG	17.70	0	0.999
Oxytocin use	55.40	0	0.999
PPH	35.70	0	0.999

DISCUSSION:

In our study, the aim was to determine the efficacy of low Cerebro Placental Ratio (CPR)as a marker of reduced fetal growth rate using the gestational age–specific reference on the prediction of adverse maternal and perinatal outcomes. Low CPR ratio remains significantly associated with 3rd trimester low abdominal circumference (AC) and lower Estimated Fetal Weight (EFW) . This suggests that cerebroplacental ratio is a potentially useful tool for the identification of at risk foetuses for lower Abdominal Circumference (AC)and Birth Weight (BW) .

The results in our study demonstrate that low CPR, is significantly associated with impaired fetal 3rd trimester AC, even in fetuses that are considered to be appropriate size.

Our study has shown that low CPR was not significantly association with increased incidence of caesarean section delivey for fetal compromise .,low APGAR score at 5 minutes (<7) and Neanatal Intensive Care Unit (NICU) admission..

Khalil A et.al, conducted a study titled “Is cerebroplacental ratio a marker of impaired fetal growth velocity and adverse pregnancy outcome” and in this study they included 7944 pregnancies in the analysis. They reported that the prevalence of SGA in this cohort was 14.5%. The overall operative delivery for fetal compromise rate was reported as 15.6%, while the neonatal unit admission rate was 3.7%. [6,18]

These findings were compared to the present study and we found that the prevalence of SGA in this cohort was 31.5%. The overall operative delivery for fetal compromise rate was 6%, while the neonatal unit admission rate was 52%.

Khalil A et al in their study reported that the ultrasound parameters and pregnancy outcome data were reported as median and Inter Quartile Range (IQR) interval between the

second- and third-trimester ultrasound scans as 18.4 and 16.6-19.6 weeks, respectively. The median and IQR gestational age at delivery were 41.1 and 39.4-41.4 weeks, and the interval between the third trimester ultrasound scan and delivery were 0.6 and 0.3- 1.0 weeks. There was a significant positive association between the AC growth velocity and birth weight centile (P < .001). [19,31]

Whereas in the present study we found that the ultrasound parameters and pregnancy outcome, the median and IQR interval between the 2nd trimester ultrasound were 23 and 22-24.6 weeks, respectively and third-trimester ultrasound scans were 37 and 36.2-38.5 weeks, respectively.Interval between third trimester Ultrasonography and gestational age at delivery was 3.2 and 2.1 –5.6 weeks, respectively. These difference between AC growth velocity and birth weight among the cases with AGA, SGA and LGA was noted and found to be statistically insignificant.

Khalil A et al in their study they concluded that as the low CPR MoM remained significantly associated with the risk of operative delivery (P =0.023) whereas this finding was in contrast with our study that low CPR was not statistically significant with risk of operative delivery (p =0.909)[32-34]

Siricoa et al performed a study on “Prediction of adverse perinatal outcome by cerebroplacental ratio adjusted for estimated fetal weight”and found that the total of 3515 singleton pregnancies, according to EFW centile, 2773 (78.9%) fetuses were AGA, 310(8.8%) SGA and 432 (12.3%) LGA.And also reported that significant difference was not found for the incidence of low APGAR score at 5 min of score (<7)among the EFW groups (P=0.008).

The CPR was lower in the SGA group than in the AGA and LGA groups (SGA group: 0.91(IQR, 0.75–1.08); AGA group: 0.99 (IQR, 0.85–1.16); LGA group: 1.06 (IQR, 0.91–1.22); P<0.001. Linear regression analysis showed a significant correlation between CPR and EFW centile (constant=0.952).

Among 75 cases with low CPR, 3 cases were had low APGAR score at 5 minutes (< 7) and among 125 cases normal CPR only one case had low APGAR score at 5 minute (<7) .The difference among them were noted and were statistically significant (p =<0.0001)

Grüttner B et.al conducted a study on "Correlation of Cerebroplacental Ratio (CPR) With Adverse Perinatal Outcome in Singleton Pregnancies" reported with retrospective analysis of total 2,270 patients were included in this, pathological CPR (<1.0) in the cohort was found in 126, normal CPR (>1.0) in 2144 .APGAR score: The one-, five- and ten-minute APGAR scorewas investigated in both study cohorts. They noticed asignificant difference in APGAR score at one, five and ten minutes between patients with pathological and normal CPR, where as patients with pathological CPR displayed a lower APGARscore compared to women with normal CPR (p<0.001). Mode of delivery: In total, 41.2% of the patients had aspontaneous delivery, whereas 9.6% had a vaginal operativedelivery and 49.3% underwent a caesarean section. The comparison of patients with spontaneous deliveryversus vaginal operative delivery showed no significant difference in the cerebroplacental index (p=0.616). Fetal birth weight: The fetal birth weight was significantly lower in patients with pathological CPR compared to patientswith normal CPR (2,436 g versus 3,136 g; p<0.001). (67)

In our study the low APGAR score at 5 minute (<7), Mode of delivery and low birth weight were not statistically different among low and normal CPR groups.

CONCLUSION:

Among the 200 cases of study population 75 cases (37.5%) and 125 cases (62.5%)were having low and normal Cerebro Placental Ratio (CPR) .The study reveals higher incidence of low Abdominal Circumference (AC) and Small for Gestational Age (SGA) babies among low CPR group compared to normal CPR women.

The present study showed no difference in the incidence of Cesearean section delivery for fetal compromise ,low APGAR Score at 5 minutes (<7) and admission to Neonatal Intensive Care Unit among the low CPR and normal CPR group women.

However ,multicentric studies with large sample size are required to further investigate the usefulness of CPR in predicting adverse maternal and perinatal outcome.

SUMMARY:

We conducted a prospective observational study on 200 pregnant women to find the efficacy of CerebroPlacental Ratio(CPR) as a predictor of impaired fetal growth and chance of undergoing cesearean section delivery for fetal compromise . We also hypothesized that lower CPR is associated with adverse perinatal outcome like low APGAR score (<7) at 5 minutes ,Small for Gestational Age (SGA) and admission to Neonatal Intensive Care Unit (NICU).

Demographic profile of three groups i.e Small for Gestational Age(SGA) ,Appropriate for Gestational age (AGA) and Large for Gestational Age (LGA) were comparable.

There were 75 (37.5%) women having low CPR as compared to 125 (62.5%) women with normal CPR among the study group of 200.

The present study reveal 84% incidence of SGA among low CPR group compared to no cases of SGA among women with normal CPR .The difference was statistically significant ($p<0.001$).

The present study also revealed that low CPR cases had 3rd trimester Mean±SD of Abdominal Circumference (AC) were 306.5 ± 17.7 as compared to normal CPR cases with Mean±SD of AC of 313.5 ± 11.1 .The low CPR was associated with increased incidence of lower AC as compared to normal CPR and the difference was statistically significant ($p<0.043$).

Among 75 low CPR cases mean and SD of Birth Weight (BW) was 2.5 ± 0.3 kg as compared to 125 women of normal CPR with BW of 2.7 ± 0.4 kg .The difference in BW among the two group were noted and it was not statistically significant ($p<0.054$).

The incidence of Caesarean Section delivery for fetal compromise was 35.2% and 36% among women with normal CPR and low CPR .The occurance of low APGAR score at 5 minutes (<7) were 1 and 3 cases respectively. The incidence of admission to Neonatal Intensive Care Unit (NICU) among the normal and low CPR groups were 51.2% and 53.3% respectively.

The above data reveals that our study there was no statistical difference among low and normal CPR groups for the incidence of Cesearean Section delivery for fetal compromise ,low APGAR score at 5 minutes (<7) and admission to Neonatal Intensive Care Unit (NICU).

Hence further multicentric studies with greater sample size is required to further investigate the usefulness of abnormal CPR as a predictor of maternal and fetal adverse outcome.

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APPENDIX

Proforma

BLDEU'S SHRI B.M.PATIL MEDICAL COLLEGE

HOSPITAL AND RESEARCH CENTRE, VIJAYAPURA

"A Prosepective study of CerebroplacentalRatio :A Marker of Impaired Fetal Growth Velocity and Adverse Pregnancy Outcome.

CASE PROFORMA

NAME: AGE:

SEX: IP/OP NO:

OCCUPATION TIME OF ADMISSION

CHIEF COMPLAINTS:

DETAILED HISTORY:

MENSTRUAL HISTORY

PaMC

LMP

OBSTETRIC HISTORY

MARRIED LIFE

OBSTETRIC SCORE

PAST HISTORTY

PERSONAL HISTORY

FAMILY HISTORY

GPE

- Built and nourishment
- Height
- Weight
- Temp
- RR
- PR
- BP
- Breast
- Thyroid
- Spine
- Pallor/icterus cyanosis clubbing edema/lymphadenopathy

Systemic examination

- CVS
- RS
- PERABDOMEN
- Perspeculum

- Per vaginal

INVESTIGATION

- HB
- BLOOD GROUP AND RH TYPING
- URINE ROUTINE
- RBS
- HBSAG
- RVD
- CT
- BT
- PLATELET
- TC
- DC
- ESR

RELEVANT USG FINDINGS:

USG

DATING SCAN (11-13WKS)

- 20 TO 25 WEEKS ANOMALY SCAN

  FETAL BIOMETRY(AC)

- AT ABOVE 35 WEEK SCAN

  FETAL BIOMETRY(AC)

- DOPPLER

  i. UMBILICAL ARTERY PI_

  ii. MCA PI

  iii. CP RATIO

DELIVERY

- INTRAPARTUM
- USE OF EPIDURAL ANALGSIA
- LABOUR

  i. SPONTANEOUS

  ii. INDUCED

LIQUOR---MECONIUM STAINED OR NOT

CTG ABNORMALITIES

USE OF QXYTOCIN

Post partum hemorrhage

1. YES
2. NO

- MODE OF DELIVERY

1. VAGINAL
2. INSTRUMENTAL
3. CEASEAREN SECTION

- APGAR SCORE

    1. AT 1 MIN

    2. AT 5 MIN

BIRTH WEIGHT:

NO. OF NICU ADMISSION.

CONSENT FORM

A prospective study of cerebroplacentalratio :A marker of impaired fetal growth velocity and adverse pregnancy outcome.

GUIDE: DR.S.R.MUDANUR (DR GIRIJA HANJAGI)

CO-GUIDE : DR.SHIVANAND PATIL

P.G. STUDENT: DR. SOUMYA S PATIL

PATIENT'S NAME:

PURPOSE OF RESEARCH I understand that I will undergo detailed history and clinical examination and investigations.

I have been informed that the purpose of this study. To investigate the role or efficacy of cerebroplacental ratio as a marker of reduced fetal growth rate.

RISKS AND DISCOMFORTS:

I understand that there is no risk involved and I may experience mild pain, after the above mentioned procedures.

BENEFITS:

I understand that my participation in this study will help in studying the role of uterine artery Doppler in predicting preeclampsia.

CONFIDENTIALITY:

I understand that the medical information produced by the study will become a part of hospital record and will be subjected to confidentiality and privacy regulations of hospital. If the data is used for publications the identity of the patient will not be revealed.

REQUEST FOR MORE INFORMATION:

I understand that I may ask for more information about the study at any time.

REFUSAL OR WITHDRAWAL OF PARTICIPATION:

I understand that my participation is voluntary and I may refuse to participate or withdraw from study at any time.

INJURY STATEMENT:

I understand in the unlikely event of injury to me during the study I will get medical treatment but no further compensations.

(Signature of Witness) (Signature of patient)

(If the patient is conscious, well oriented and fully aware)

(Signature of Candidate)

STUDY SUBJECT CONSENT STATEMENT:

I/my ward confirm that Dr.Soumya S Patil has explained to me the purpose of this research, the study procedure that I will undergo and the possible discomforts and benefits that I may experience, in my own language.

I/my ward have been explained all the above in detail in my own language and I understand the same. Therefore I agree to give my consent to participate as a subject in this project.

_____	_____
(Participant)	Date
_____	_____
(Witness to above signature)	Date

Master Chart

SR NO.	DATE	OP/IP NO.	NAMES	AGE	MC	LMP	ML	GRAVIDA	PARA	LIVING	DEATH	ABORTION	HT	WT	BMI
1	1.1.19	20	PREMA	23	N N R	20.4.18	3	2	0	0	0	1	154	49	20.7
2	7.1.19	12	RUKMINI	25	N N R	23.4.18	1	2	1	1	0	0	159	52	20.6
3	2.1.19	261	REKHA	35	N N R	20.3.18.	5	3	1	1	0	1	154	59	24.9
4	20.4.19	12376	PARVATI	38	N N R	1.8.18	2	1	0	0	0	0	158	59	23.6
5	20.4.19	12324	MUNNI JAFAR	25	N N R	10.5.18	6	3	2	2	0	0	158	58	23.2
6	19.4.19	12279	SOUBHAYA	22	N N R	20.7.19	5	2	1	1	0	0	160	63	24.6
7	14.2.20	5669	ASHWINI	20	N N R	5.6.19	1	1	0	0	0	0	158	60	24.0
8	17.2.20	5908	SHRUTI	24	N N R	4.6.19	1	1	0	0	0	0	148	58	26.5
9	19.4.19	12279	SOUJANYA	22	N N R	26.7.18	6	2	1	1	0	0	159	60	23.7
10	5.8.20	164468	CHAITRA	22	N N R	4.12.19	1	1	0	0	0	0	150	48	21.3
11	5.8.20	164528	VARSHA	22	irregular	9.11.19	3	1	1	1	0	0	156	52	21.4
12	14.2.19	5668	AKSHATA	23	N N R	5.6.19	1	1	0	0	0	0	158	60	24.0
13	19.7.20	17356	AKSHATA	25	N N R	5.10.19	2	1	0	0	0	0	160	58	22.7
14	22.7.20	17255	KAMALAVVA	35	N N R	25.10.19	3	2	1	1	0	0	150	55	24.4
15	22.07.20	17345	POOJA	24	N N R	14.10.19	6	3	2	2	0	0	155	62	25.8
16	23.07.20	17440	KAVITA	24	N N R	12.10.19	2	1	0	0	0	0	152	50	21.6
17	22.7.20	17344	BHAVANSHREE	24	N N R	25.10.19	1	1	0	0	0	0	156	54	22.2
18	16.07.20	17018	DEVAMMA	19	N N R	20.8.19	3	3	0	0	0	2	142	52	25.8
19	23.07.20	17436	ASHA	26	N N R	19.10.19	5	4	2	2	0	1	156	60	24.7
20	23.07.20	17399	GANGUNBHAI	18	N N R	20.10.19	1	1	0	0	0	0	156	52	21.4
21	19.07.20	17149	RANJITHA	26	N N R	24.10.19	9	5	4	2	2	0	150	50	22.2
22	12.07.20	16760	SHRUTI.T	28	N N R	24.09.19	1	1	0	0	0	0	155	50	20.8
23	20.07.20	17219	GEETA	25	N N R	14.10.19	10	4	3	1	2	0	150	58	25.8
24	21.7.20	17273	PRIYANKA	27	N N R	27.10.19	2	1	0	0	0	0	155	60	25.0
25	22.7.20	17397	KAVITA	20	N N R	2.10.19	3	2	1	1	0	0	150	55	24.4
26	20.7.20	17212	CHINMAMMA	31	N N R	18.10.19	1	1	0	0	0	0	159	52	20.6
27	22.07.20	17483	SHOBHA	22	N N R	24.11.19	3	1	0	0	0	0	150	50	22.2
28	23.7.20	17521	ANITA	25	irregular	15.10.19	1	1	0	0	0	0	153	58	24.8
29	25.07.20	17515	DURGAWWA	22	N N R	14.9.19	10	2	1	1	0	0	164	62	23.1
30	20.7.20	17453	NIKITA	21	N N R	11.11.19	1	1	0	0	0	0	150	52	23.1
31	25.07.20	17523	GANGUBAI	30	N N R	10.10.19	10	4	2	2	0	1	146	52	24.4
32	24.7.20	17474	RIYANA	29	N N R	10.12.19	7	3	2	2	0	0	159	58	22.9
33	21.7.20	17307	ANNAPURNA	25	N N R	18.10.19	2	1	0	0	0	0	156	60	24.7
34	6.07.20	16421	ROOPA	28	N N R	24.10.19	5	2	1	1	0	0	162	58	22.1
35	21.7.20	17458	GANGABHAI	18	N N R	17.10.19	1	1	0	0	0	0	155	50	20.8
36	9.7.20	16623	SHOBHA	28	N N R	1.11.19	7	2	1	1	0	0	150	50	22.2
37	29.6.20	16017	JYOTI	24	N N R	1.12.19	4	2	1	1	0	0	156	58	23.8
38	20.7.20	17243	AYEESHA	22	N N R	21.10.19	2	1	0	0	0	0	150	48	21.3
39	9.7.20	16632	GEETA	20	N N R	4.12.19	1	1	0	0	0	0	156	54	22.2
40	22.7.20	17370	SUNITA	20	N N R	11.11.19	1	1	0	0	0	0	158	53	21.2
41	20.7.20	17080	MAHANADA	35	N N R	15.12.19	8	3	2	2	0	0	155	52	21.6
42	22.7.20	17391	KASTURI	30	N N R	14.11.19	4	3	2	2	0	0	155	55	22.9
43	25.7.20	17530	SANA	22	N N R	10.12.19	4	1	0	0	0	3	156	50	20.5
44	22.7.20	17343	SAVITA	27	N N R	8.12.19	10	3	2	2	0	0	156	52	21.4
45	12.7.20	17506	SHARADHA	32	N N R	12.12.19	8	1	0	0	0	0	150	50	22.2
46	25.7.20	17522	SHAILA	21	N N R	16.12.19	5	1	0	0	0	0	156	52	21.4
47	23.7.20	17446	ANITA	22	N N R	8.11.19	3	2	1	1	0	0	156	60	24.7
48	26.7.20	17607	RAJASHRI	28	N N R	13.11.19	5	3	2	2	0	0	156	61	25.1
49	27.7.20	17643	SUMA	20	N N R	21.11.19	1	1	0	0	0	0	155	50	20.8
50	26.7.20	17632	SWATI	25	N N R	2.12.19	2	1	0	0	0	0	156	51	21.0
51	31.7.20	17868	RENUKA	20	N N R	12.12.19	4	2	1	1	0	0	152	48	20.8
52	12.2.19	23241	GEETA	24	N N R	14.10.18	2	1	0	0	0	0	155	49	20.4
53	13.2.19	24341	SANGEETA	20	N N R	22.10.18	1	1	0	0	0	0	156	52	21.4
54	11.2.19	284880	SHIVAGANGA	24	N N R	25.10.18	3	1	0	0	0	0	155	54	22.5
55	10.2.19	382240	GANGABHAI	23	N N R	2.10.18	4	3	0	0	0	2	158	67	26.8
56	14.2.19	34261	GANGA	23	N N R	18.12.18	1	1	0	0	0	0	161	45	17.4
57	11.2.19	36420	SHIVLEELA	26	N N R	11.11.18	1	1	0	0	0	0	153	48	20.5
58	17.2.20	59081	SHRUTI	19	N N R	20.5.20	1	1	0	0	0	0	168	62	22.0
59	25.2.20	6902	SUPRIYA	36	N N R	11.6.20	10	4	3	2	1	0	163	69	26.0
60	12.2.19	5669	ASHWINI	20	N N R	5.6.19	1	1	0	0	0	0	158	58	23.2
61	3.2.19	5954	LAXMI	37	N N R	25.5.19	20	8	4	2	2	3	160	72	28.1
62	24.2.20	6763	HAMIDA	23	N N R	14.3.20	1	3	1	1	1	0	168	70	24.8
63	28.2.20	85667	AMRUTA	25	N N R	6.6.19	4	2	1	1	0	0	159	68	26.9
64	11.2.20	5248	SANGEETA	23	N N R	4.8.19	1	1	0	0	0	0	162	67	25.5
65	20.10.19	2583	NAZNEEN	29	N N R	19.6.19	3	1	0	0	0	0	162	92	35.1
66	11.1.20	24127	SHABANA	25	N N R	18.8.19	7	3	2	2	0	0	158	62	24.8
67	15.10.19	58615	PALLAVI	25	N N R	29.5.19	3	2	1	1	0	0	156	52	21.4
68	22.2.20	6571	MALLAMA	22	N N R	18.9.19	1	1	0	0	0	0	153	64	27.3
69	13.3.20	9104	GEETA H	30	N N R	7.7.19	4	1	0	0	0	0	160	70	27.3
70	15.10.19	41384	POOJA	29	N N R	30.5.19	1	1	0	0	0	0	156	58	23.8
71	15.11.19	40256	LAXMI	19	N N R	25.5.19	1	1	0	0	0	0	163	76	28.6
72	2.2.20	85117	GEETANJALI	28	N N R	21.10.19	7	4	2	1	0	1	152	52	22.5
73	20.7.20	16760	SHRUTI	28	N N R	10.1.20	5	1	0	0	0	0	159	56	22.2
74	4.8.20	18189	GEETA	27	N N R	15.4.20	5	3	2	2	0	0	155	51	21.2
75	23.1.20	8915	BHARATI	30	N N R	28.11.19	7	2	0	1	0	1	157	58	23.5
76	10.8.20	18532	PUSHPA	23	N N R	12.4.20	1	1	0	0	0	0	153	52	22.2
77	13.3.20	9102	PREMA	34	N N R	30.6.19	5	3	1	1	0	1	162	70	26.7
78	22.1.19	17248	SANDHYA	28	N N R	1.5.18	3	1	0	0	0	1	163	54	20.3
79	25.6.19	19562	SAVITRI	25	N N R	15.1.19	3	2	1	1	0	0	152	62	26.8
80	26.6.19	20309	PARVEEN	23	N N R	28.10.19	4	3	1	1	0	1	158	58	23.2
81	19.6.19	20080	MAHADEVI	20	N N R	16.9.18	1	1	0	0	0	0	152	60	26.0
82	20.2.19	318588	LAXMI	19	N N R	17.9.18	1	1	0	0	0	0	158	60	24.0
83	24.2.20	6768	ANITA	23	N N R	14.5.19	7	3	2	0	0	0	155	52	21.6
84	25.2.20	137859	AFSANA	30	N N R	1.11.19	6	2	1	1	0	0	158	59	23.6
85	19.2.20	6303	GANGAVVA	33	N N R	15.9.19	5	2	1	1	0	0	158	60	24.0
86	2.1.19	261	REKHA	35	N N R	20.3.18	5	3	1	1	0	1	158	58	23.2
87	22.6.19	19936	POORNIMA	21	N N R	15.1.19	1	1	0	0	0	0	156	54	22.2
88	20.4.19	12370	PARVATI	38	N N R	1.8.18	2	1	0	0	0	0	148	52	23.7
89	20.4.19	12324	MUNNI JAFAR	25	N N R	10.5.18	6	3	2	2	0	0	160	58	22.7
90	25.12.19	55/2019	PREMA	23	N N R	15.7.19	1	1	0	0	0	0	156	54	22.2
91	4.9.19	29296	BHUVANESHWARI	25	N N R	21.1.19	3	2	1	1	0	0	152	52	22.5
92	23.9.19	31546	PARAVIN	21	N N R	15.3.19	2	2	1	1	0	0	155	53	22.1
93	28.3.20	10486	SHILPA	22	N N R	12.8.19	3	2	1	1	0	0	155	59	24.6
94	21.3.20	116619	SAMEENA	27	N N R	13.6.19	5	4	2	2	0	1	156	58	23.8
95	24.2.20	5964	NAGARATNA	20	N N R	11.5.19	1	1	0	0	0	0	158	58	23.2
96	18.2.20	6111	AKSHATA	23	N N R	25.9.19	1	1	0	0	0	0	150	54	24.0
97	12.2.20	65044	SHILPA	23	N N R	5.5.19	3	1	0	0	0	0	151	54	23.7
98	24.2.20	6763	HAMIDA	23	N N R	15.8.19	3	3	1	1	0	1	151	53	23.2

99	11.2.20	5248	SANGEETA	23	N N R	23.9.19	2	1	0	0	0	0	155	50	20.8
100	13.2.20	5514	RENUKA	25	N N R	5.6.19	3	2	1	1	0	0	156	59	24.2
101	14.2.20	5669	ASHWINI	20	N N R	4.6.19	1	1	0	0	0	0	156	62	25.5
102	2.10.19	5496	SAVITHA	20	N N R	24.6.19	3	2	1	1	0	0	154	60	25.3
103	26.5.20	13595	RESHMA	20	N N R	12.10.19	1	1	0	0	0	0	150	52	23.1
104	26.3.20	10400	BHOURAMA	27	N N R	16.7.19	5	3	1	1	0	0	151	51	22.4
105	4.9.20	138524	ARATI	24	N N R	9.11.19	3	2	1	1	0	0	183	61	18.2
106	14.3.20	137116	VIDYA	22	N N R	18.8.19	1	1	0	0	0	0	155	53	22.1
107	8.8.20	165084	SUNDERBHAI	28	N N R	6.12.19	5	2	2	2	0	0	156	62	25.5
108	21.8.19	27797	SEEMA	29	N N R	12.12.18	5	2	1	1	0	0	156	52	21.4
109	16.12.19	457651	MAHADEVI	28	N N R	20.3.19	5	3	2	2	0	0	153	54	23.1
110	28.2.20	85659	SAVITA	26	N N R	26.12.19	3	2	1	1	0	0	160	57	22.3
111	28.2.20	85713	KAVERI	25	N N R	1.6.19	7	4	2	2	0	1	151	49	21.5
112	28.2.20	85671	BHARATI	35	N N R	30.6.19	12	6	5	4	1	0	156	52	21.4
113	28.2.20	85615	PALLAVI	25	N N R	29.5.19	3	2	1	1	0	0	153	59	25.2
114	28.2.20	85667	AMRUTA	25	N N R	6.6.19	4	2	2	1	0	0	153	59	25.2
115	28.2.20	85117	GEETANJALI	28	N N R	21.10.19	7	4	2	2	0	1	155	58	24.1
116	17.9.19	764/19	POOJA	19	N N R	30.5.19	2	1	1	0	0	0	155	63	26.2
117	25.4.19	12376	PARVATI	38	N N R	1.8.18	2	1	1	0	0	0	151	60	26.3
118	17.2.20	5954	LAXMI	37	N N R	25.5.19	20	8	4	2	2	3	152	58	25.1
119	20.4.19	12279	SOUBHAGAYA	22	N N R	26.7.18	3	2	1	1	0	0	154	60	25.3
120	22.2.20	6571	MALLAMMA	19	N N R	10.5.19	1	1	1	0	0	0	155	48	20.0
121	17.2.20	5966	GEETA	28	N N R	14.5.20	10	4	3	2	2	3	158	52	20.8
122	5.2.20	4389	SAVITRI	28	N N R	9.5.19	2	2	1	1	0	1	158	60	24.0
123	10.2.20	4951	NURAJAN	24	N N R	15.5.19	6	2	1	1	0	0	152	58	25.1
124	10.2.20	5022	RENUKA	25	N N R	13.5.19	2	2	1	1	0	0	151	55	24.1
125	6.2.20	4552	LAXMI	26	N N R	10.5.19	3	2	1	1	0	0	150	62	27.6
126	6.2.20	4553	AMRUTHA	25	N N R	2.5.19	10	4	2	2	0	1	160	50	19.5
127	7.2.20	4622	SUJATHA	28	N N R	18.5.19	4	2	1	1	0	0	159	54	21.4
128	16.1.20	1911	JOTHSANA	35	irregular	5.5.19	10	6	2	2	0	3	154	52	21.9
129	26.2.20	83080	SHABANA	25	N N R	18.8.19	7	3	2	2	0	0	155	60	25.0
130	6.3.20	8272	SOUMYASHREE	21	N N R	2.6.19	3	2	2	1	0	1	155	52	21.6
131	24.8.19	300555	RUKMINI	30	N N R	22.11.18	12	1	0	0	0	0	153	50	21.4
132	24.8.19	301112	ASHWINI	24	N N R	28.11.18	3	3	2	2	0	0	151	50	21.9
133	21.8.19	297314	JYOTI	19	N N R	18.6.19	2	2	0	0	0	1	155	58	24.1
134	27.8.19	304697	SHILPA	24	N N R	25.11.18	2	3	2	2	0	0	158	60	24.0
135	5.9.19	29532	SUNITA	20	N N R	14.5.19	2	2	1	1	0	0	154	55	23.2
136	5.9.19	29552	SHREEDEVI	29	N N R	6.4.19	3	2	1	1	0	0	153	52	22.2
137	4.10.19	33118	SHEETAL	32	N N R	15.9.19	2	1	0	0	0	0	150	50	22.2
138	4.10.19	357540	SAVITA	30	N N R	8.5.19	5	2	0	0	0	1	156	58	23.8
139	5.10.19	33359	SAVITRI	25	N N R	2.6.19	5	4	2	2	0	1	158	62	24.8
140	9.10.19	363586	LAXMI	25	N N R	6.8.19	8	3	2	2	0	0	157	52	21.1
141	10.10.19	33794	VIDYA	27	N N R	14.8.19	2	1	0	0	0	0	159	52	20.6
142	14.10.19	34316	MEENAKSHI	20	N N R	2.7.19	4	2	0	0	0	1	161	58	22.4
143	27.10.19	36036	KOMAL	20	N N R	14.8.19	8	3	1	0	1	1	152	60	26.0
144	2.11.19	36788	SUNANDA	20	N N R	22.7.19	2	1	0	0	0	0	154	58	24.5
145	16.11.19	38386	BHAGYASHREE	18	N N R	6.8.19	1	1	0	0	0	0	159	50	19.8
146	6.11.19	38486	KAVITA	29	N N R	14.8.19	10	8	2	1	1	0	158	50	20.0
147	20.11.19	39017	SHILPA	28	N N R	2.7.19	5	2	1	1	0	0	153	58	24.8
148	23.11.19	39377	HASEENA	25	N N R	15.7.19	3	2	1	1	0	0	152	48	20.8
149	1.3.20	7580	LAKSHMI	22	N N R	1.2.20	2	1	0	0	0	0	154	54	22.8
150	1.3.20	7581	LALBI	24	N N R	2.1.20	3	1	0	0	0	0	157	53	21.5
151	25.2.20	6902	SUPRIYA	36	N N R	21.1.20	8	4	3	2	1	0	158	52	20.8
152	1.3.20	7630	NEELAMMA	20	N N R	15.5.19	2	1	0	0	0	0	155	55	22.9
153	29.2.20	87064	NEELAGANGABAI	30	N N R	8.6.19	5	2	1	1	0	0	152	50	21.6
154	12.3.20	7646	MADHU	23	N N R	21.1.20	3	2	1	1	0	0	152	52	22.5
155	3.3.20	7845	DEEPA	20	N N R	2.2.20	1	1	0	0	0	0	154	50	21.1
156	23.3.20	7895	REKHA	25	N N R	15.2.20	3	2	1	1	0	0	153	52	22.2
157	3.3.20	7833	VAISHALI	24	N N R	5.2.20	3	2	1	1	0	0	152	60	26.0
158	25.3.20	8197	BASAMMA	25	N N R	14.1.20	5	3	2	2	0	0	159	61	24.1
159	14.3.20	8106	RAJAMA	25	N N R	15.1.20	3	2	1	1	0	0	159	50	19.8
160	6.3.20	8270	TANIJA	23	N N R	11.6.20	4	3	2	2	0	0	154	51	21.5
161	5.3..20	8195	LAXMI	19	N N R	15.1.20	1	1	0	0	0	0	156	48	19.7
162	7.3.20	8400	RENUKA	22	N N R	12.1.20	3	3	1	1	0	1	153	49	20.9
163	12.3.20	8997	JAYASHREE	29	N N R	11.1.20	8	6	3	2	1	2	152	52	22.5
164	10.3.20	8730	GAYATRI	20	N N R	12.1.20	1	1	0	0	0	0	152	54	23.4
165	22.3.20	9104	GEETA	30	N N R	12.2.20	10	7	3	2	2	3	151	67	29.4
166	12.3.20	9029	SHILPA	23	N N R	02.1.20	1	1	0	0	0	0	151	45	19.7
167	24.3.20	9274	SHRUTI	28	N N R	4.1.20	4	4	1	1	0	2	159	48	19.0
168	13.3.20	9102	PREMA	34	N N R	12.12.19	10	3	1	1	0	1	154	62	26.1
169	1.9.19	28979	LAXMI	26	N N R	14.7.19	4	2	1	1	0	0	152	69	29.9
170	24.2.20	6763	HAMIDA	22	N N R	22.12.19	4	3	1	1	0	0	150	58	25.8
171	23.5.20	13466	SUDHARANI	27	N N R	12.2.20	1	1	0	0	0	0	156	72	29.6
172	24.5.20	13490	SWATI	22	N N R	22.2.20	3	2	1	1	0	0	160	70	27.3
173	24.5.20	13499	DEVAMMA	22	N N R	23.3.20	1	1	0	0	0	0	159	68	26.9
174	1.8.20	18016	KAVERI	28	N N R	14.5.20	5	3	2	2	0	0	145	67	31.9
175	1.8.20	17981	ANARKALI	22	N N R	16.5.20	2	1	0	0	0	0	149	82	36.9
176	30.7.20	17835	NEELAMMA	24	N N R	12.4.20	4	3	2	1	1	0	148	62	28.3
177	30.7.20	17858	SANAKOUSAR	27	N N R	12.11.19	5	3	1	1	0	1	157	52	21.1
178	5.8.20	18223	SHILPA	20	N N R	12.12.19	1	1	0	0	0	0	154	64	27.0
179	7.8.20	18382	MEENAXI	25	N N R	22.12.19	4	3	2	2	0	0	153	70	29.9
180	11.8.20	18593	KAVERI	20	N N R	25.12.19	2	1	0	0	0	0	150	58	25.8
181	10.8.20	18533	REESABANU	29	N N R	12.1.20	7	4	3	2	1	0	159	76	30.1
182	7.8.20	18385	LAXMI	18	N N R	.22.1.20	1	1	0	0	0	0	158	52	20.8
183	12.8.20	18644	SUJATA	27	N N R	12.12.19	4	3	1	1	0	1	156	56	23.0
184	15.8.20	18852	JAGADEVI	30	N N R	26.12.19	5	1	0	0	0	0	161	51	19.7
185	15.8.20	18839	SHILPA	32	N N R	22.12.20	10	6	3	2	1	2	163	58	21.8
186	17.8.20	18904	ASHA	22	N N R	2.12.19	2	1	0	0	0	0	156	52	21.4
187	15.8.20	18838	JYOTI	22	N N R	26.12.19	3	2	0	0	0	1	158	70	28.0
188	16.8.20	18870	ASHWINI	20	N N R	14.12.19	2	1	0	0	0	0	151	54	23.7
189	17.8.20	18905	KAVITA	28	N N R	29.11.19	3	1	0	0	0	0	155	62	25.8
190	16.8.20	18879	RANJITHA	20	N N R	2.12.19	2	2	0	0	0	1	153	58	24.8
191	17.8.20	18896	LAXMI	24	N N R	20.12.15	2	1	0	0	0	0	152	60	26.0
192	16.8.20	18892	ASMA	19	N N R	25.12.19	1	1	0	0	0	0	150	60	26.7
193	18.8.20	18955	SAVITA	24	N N R	22.12.19	3	2	1	1	0	0	150	52	23.1
194	17.8.20	18897	JYOTI	26	N N R	12.12.19	5	2	0	0	0	1	150	59	26.2
195	19.8.20	19020	MADHU	20	N N R	12.12.20	2	1	0	0	0	0	154	60	25.3
196	19.8.20	19019	RAJMA	24	N N R	5.1.20	3	2	1	0	0	0	165	58	21.3
197	20.8.20	19071	BHAGYASHREE	29	N N R	24.2.20	5	2	1	1	0	0	152	54	23.4
198	20.8.20	19064	ANISA	23	N N R	12.1.20	3	2	1	1	0	0	159	52	20.6
199	4.7.20	16384	POOJA	21	N N R	11.11.19	2	1	0	0	0	0	164	58	21.6
200	3.7.20	16327	LAXMI	24	N N R	24.11.19	6	5	2	2	0	2	152	54	23.4

SR NO.	GA 2ND (USG)	GA 2ND (LMP)	AC 2ND (USG)	AC 2ND (STD)	PERCENTAGE	EFW 2ND (USG)	EFW 2ND (STD)	PERCENTAGE	GA 3RD (USG)	GA 3RD (LMP)	AC 3RD (USG)	AC 3RD (STD)	PERCENTAGE
1	22.0	23.0	160.0	185.0	43.2	442.0	565.0	39.1	37.0	38.0	337.0	338.0	49.9
2	20+2	22.0	138.0	173.0	39.9	290.0	476.0	30.5	36.0	35.0	318.0	307.0	51.8
3	23.0	24.0	100.0	197.0	25.4	444.0	665.0	33.4	38+4	38.0	336.0	338.0	49.7
4	23+3	22.0	188.0	173.0	54.3	604.0	476.0	63.4	39+3	40.0	254.0	363.0	35.0
5	22+3	22.0	159.0	173.0	46.0	514.0	476.0	54.0	37+4	39.0	335.0	350.0	47.9
6	21.0	22.0	140.0	173.0	40.5	452.0	476.0	47.5	37+4	39.0	335.0	350.0	47.9
7	20+2	21.0	162.0	162.0	50.0	353.0	398.0	44.3	38+4	39.0	345.0	350.0	49.3
8	22+2	23.0	176.0	185.0	47.6	400.0	565.0	35.4	38+2	39.0	335.0	350.0	47.9
9	24+3	24.0	250.0	197.0	63.5	400.0	665.0	30.1	37+3	39.0	335.0	350.0	47.9
10	23+3	25.0	195.0	208.0	46.9	660.0	778.0	42.4	35+3	37.0	293.0	328.0	44.7
11	23+3	25.0	195.0	208.0	46.9	450.0	778.0	28.9	35+3	36.0	316.0	317.0	49.8
12	20+2	21.0	150.0	162.0	46.3	353.0	398.0	44.3	38+4	39.0	345.0	350.0	49.3
13	23+3	24.0	189.0	197.0	48.0	390.0	665.0	29.3	33+3	36.0	239.0	317.0	37.7
14	23+3	20.0	135.0	150.0	45.0	300.0	330.0	45.5	32+2	37.0	370.0	328.0	56.4
15	20+2	22.0	135.0	173.0	39.0	320.0	476.0	33.6	32+6	36.0	295.0	317.0	46.5
16	23.3	24.0	195.0	197.0	49.5	480.0	665.0	36.1	32+2	36.0	277.0	317.0	43.7
17	20+2	23.0	200.0	185.0	54.1	389.0	565.0	34.4	33+0	37.0	291.0	328.0	44.4
18	23+2	25.0	195.0	208.0	46.9	510.0	778.0	32.8	33+6	36.0	360.0	317.0	56.8
19	20+2	21.0	153.0	162.0	47.2	360.0	398.0	45.2	38+4	40.0	350.0	363.0	48.2
20	24.0	24.0	180.0	197.0	45.7	423.0	665.0	31.8	40.0	40.0	352.0	363.0	48.5
21	23+5	24.0	196.0	197.0	49.7	590.0	665.0	44.4	38+6	39.0	356.0	350.0	50.9
22	23+5	25.0	195.0	208.0	46.9	668.0	778.0	42.9	32+5	36.0	268.9	317.0	42.4
23	22+6	24.0	154.0	197.0	39.1	450.0	665.0	33.8	34+5	38.0	300.0	338.0	44.4
24	22.0	24.0	156.0	197.0	39.6	300.0	665.0	22.6	33+6	37.0	298.0	328.0	45.4
25	20+4	22.0	154.0	173.0	44.5	380.0	476.0	39.9	34+2	38.0	300.0	338.0	44.4
26	22+2	24.0	175.0	197.0	44.4	586.0	665.0	44.1	33+3	36.0	294.0	317.0	46.4
27	20.0	24.0	165.0	197.0	41.9	549.0	665.0	41.3	32.0	35.0	288.0	307.0	46.9
28	20+4	24.0	128.0	197.0	32.5	376.0	665.0	28.3	33+6	36.0	299.0	317.0	47.2
29	21+5	23.0	146.0	185.0	39.5	523.0	565.0	46.3	33+5	36.0	288.0	317.0	45.4
30	20+2	22.0	158.0	173.0	45.7	450.0	476.0	47.3	32.0	36.0	275.0	317.0	43.4
31	22+6	25.0	195.0	208.0	46.9	686.0	778.0	44.1	33+5	37.0	300.0	328.0	45.7
32	24+2	25.0	195.0	208.0	46.9	674.0	778.0	43.3	33+6	36.0	286.0	317.0	45.1
33	23.0	23.0	123.0	185.0	33.2	520.0	565.0	46.0	34.0	36.0	298.0	317.0	47.0
34	22+6	23.0	154.0	185.0	41.6	495.0	565.0	43.8	35.0	36.0	310.0	317.0	48.9
35	23.0	24.0	158.0	197.0	40.1	539.0	665.0	40.5	35+6	36.0	320.0	317.0	50.5
36	20.0	21.0	143.0	162.0	44.1	350.0	398.0	44.0	33+2	35.0	270.0	307.0	44.0
37	22.0	22.0	146.0	173.0	42.2	450.0	476.0	47.3	33.0	36.0	305.0	317.0	48.1
38	23.0	23.0	155.0	185.0	41.9	555.0	565.0	49.1	36+1	37.0	322.0	328.0	49.1
39	24.0	24.0	198.0	197.0	50.3	682.0	665.0	51.3	35+1	36.0	300.0	317.0	47.3
40	22.0	23.0	198.0	185.0	53.5	513.0	565.0	45.4	34+3	35.0	286.0	307.0	46.6
41	24.0	24.0	145.0	197.0	36.8	623.0	665.0	46.8	35.0	36.0	268.0	317.0	42.3
42	23+1	23.0	155.0	185.0	41.9	541.0	565.0	47.9	38+4	39.0	335.0	350.0	47.9
43	23.0	23.0	143.0	185.0	38.6	498.0	565.0	44.1	38.0	38.0	315.0	338.0	46.6
44	21.0	21.0	169.0	162.0	52.2	356.0	398.0	44.7	36.0	37.0	350.0	328.0	53.4
45	22.0	23.0	158.0	185.0	42.7	458.0	565.0	40.5	35+2	35.0	313.0	307.0	51.0
46	23.0	23.0	146.0	185.0	39.5	489.0	565.0	43.3	37.0	38.0	300.0	338.0	44.4
47	24.0	24.0	186.0	197.0	47.2	625.0	665.0	47.0	34+6	35.0	308.0	307.0	50.2
48	25.0	25.0	195.0	208.0	46.9	756.0	778.0	48.6	34+6	36.0	308.0	317.0	48.6
49	23.0	23.0	185.0	185.0	50.0	520.0	565.0	46.0	37+3	39.0	335.0	350.0	47.9
50	24.0	24.0	195.0	197.0	49.5	623.0	665.0	46.8	35.0	35.0	298.0	307.0	48.5
51	23.0	23.0	199.0	185.0	53.8	529.0	565.0	46.8	36.0	37.0	302.0	328.0	46.0
52	23+4	24.0	154.0	197.0	39.1	656.0	665.0	49.3	36.0	36.0	315.0	317.0	49.7
53	22.0	22.0	201.0	173.0	58.1	452.0	476.0	47.5	38.0	38.0	298.0	338.0	44.1
54	23.0	23.0	165.0	185.0	44.6	526.0	565.0	46.5	37.0	38.0	312.0	338.0	46.2
55	24.0	24.0	162.0	197.0	41.1	629.0	665.0	47.3	36.0	36.0	334.0	317.0	52.7
56	20.0	20.0	145.0	150.0	48.3	326.0	330.0	49.4	35.0	36.0	286.0	317.0	45.1
57	25.0	25.0	195.0	208.0	46.9	698.0	778.0	44.9	38.0	38.0	310.0	338.0	45.9
58	24.0	24.0	192.0	197.0	48.7	850.0	665.0	63.9	34+3	35.0	304.0	307.0	49.5
59	23+6	24.0	191.0	197.0	48.5	817.0	665.0	61.4	33+6	36.0	298.0	317.0	47.0
60	24+4	25.0	195.0	208.0	46.9	706.0	778.0	45.4	35+6	36.0	318.0	317.0	50.2
61	21.0	21.0	237.0	162.0	73.1	329.0	398.0	41.3	35+6	38.0	319.0	338.0	47.2
62	25+1	25.0	195.0	208.0	46.9	860.0	778.0	55.3	38.0	38.0	303.0	338.0	44.8
63	23.0	23.0	170.0	185.0	45.9	510.0	565.0	45.1	35.0	35.0	298.0	307.0	48.5
64	23.0	24.0	175.0	197.0	44.4	650.0	665.0	48.9	38.0	38.0	301.0	338.0	44.5
65	21.0	21.0	159.0	162.0	49.1	355.0	398.0	44.6	35.0	35.0	258.0	307.0	42.0
66	24.0	25.0	195.0	208.0	46.9	585.0	778.0	37.6	37.0	37.0	312.0	328.0	47.6
67	23+2	23.0	201.0	185.0	54.3	632.0	565.0	55.9	36+2	37.0	330.0	328.0	50.3
68	25.0	25.0	195.0	208.0	46.9	870.0	778.0	55.9	39.0	39.0	342.0	350.0	48.9
69	25.0	25.0	195.0	208.0	46.9	740.0	778.0	47.6	35+1	35.0	311.0	307.0	50.7
70	23+6	24.0	191.0	197.0	48.5	650.0	665.0	48.9	37.0	38.0	290.0	338.0	42.9
71	24.0	24.0	197.0	197.0	50.0	800.0	665.0	60.2	37.0	38.0	303.0	338.0	44.8
72	23.0	23.0	178.0	185.0	48.1	513.0	565.0	45.4	35.0	35.0	286.0	307.0	46.6
73	18+5	20.0	132.0	150.0	44.0	252.0	330.0	38.2	32+2	36.0	536.0	317.0	84.5
74	22.0	22.0	245.0	173.0	70.8	350.0	476.0	36.8	37.0	39.0	324.0	350.0	46.3
75	24.0	24.0	235.0	197.0	59.6	735.0	665.0	55.3	34+4	35.0	299.0	307.0	48.7
76	20.0	20.0	135.0	150.0	45.0	309.0	330.0	46.8	36.0	37.0	273.0	328.0	41.6
77	21.0	21.0	160.0	162.0	49.4	356.0	398.0	44.7	35.0	35.0	278.0	307.0	45.3
78	22.0	22.0	167.0	173.0	48.3	429.0	476.0	45.1	35.0	35.0	287.0	307.0	46.7
79	22.0	22.0	166.0	173.0	48.0	410.0	476.0	43.1	38.0	38.0	301.0	338.0	44.5
80	21.0	21.0	155.0	162.0	47.8	350.0	398.0	44.0	37.0	37.0	286.0	328.0	43.6
81	23.0	23.0	175.0	185.0	47.3	560.0	565.0	49.6	39.0	39.0	302.0	350.0	43.1
82	22.0	22.0	153.0	173.0	44.2	426.0	476.0	44.7	39.0	39.0	332.0	350.0	47.4
83	19+6	20.0	146.0	150.0	48.7	300.0	330.0	45.5	35+2	35.0	312.0	307.0	50.8
84	24.0	24.0	193.0	197.0	49.0	743.0	665.0	55.9	34.0	35.0	310.0	307.0	50.5
85	21.0	21.0	150.0	162.0	46.3	353.0	398.0	44.3	38+4	39.0	345.0	350.0	49.3
86	23+4	24.0	188.0	197.0	47.7	350.0	665.0	26.3	39+1	40.0	366.0	363.0	50.4
87	23.0	23.0	197.0	185.0	53.2	356.0	565.0	31.5	34+4	35.0	306.0	307.0	49.8
88	23+4	24.0	188.0	197.0	47.7	650.0	665.0	48.9	39.0	39.0	354.0	350.0	50.6
89	22+2	22.0	176.0	173.0	50.9	514.0	476.0	54.0	37+3	37.0	335.0	328.0	51.1
90	24.0	24.0	189.0	197.0	48.0	569.0	665.0	42.8	35.0	35.0	287.0	307.0	46.7
91	20.0	20.0	131.0	150.0	43.7	309.0	330.0	46.8	35.0	35.0	280.0	307.0	45.6
92	25.0	25.0	195.0	208.0	46.9	746.0	778.0	47.9	38.0	38.0	331.0	338.0	49.0
93	22.0	22.0	159.0	173.0	46.0	430.0	476.0	45.2	37.0	37.0	315.0	328.0	48.0
94	24+2	25.0	195.0	208.0	46.9	842.0	778.0	54.1	39.0	39.0	345.0	350.0	49.3
95	22.0	22.0	163.0	173.0	47.1	413.0	476.0	43.4	36.0	36.0	311.0	317.0	49.1
96	21.0	21.0	162.0	162.0	50.0	413.0	398.0	51.9	37+5	38.0	332.0	338.0	49.1
97	24.0	25.0	195.0	208.0	46.9	356.0	778.0	22.9	38+3	39.0	342.0	350.0	48.9
98	25.0	25.0	195.0	208.0	46.9	869.0	778.0	55.8	35+6	36.0	300.0	317.0	47.3
99	25.0	25.0	195.0	208.0	46.9	658.0	778.0	42.3	38.0	38.0	298.0	338.0	44.1
100	25.0	25.0	195.0	208.0	46.9	641.0	778.0	41.2	38.0	38.0	336.0	338.0	49.7
101	24+5	25.0	195.0	208.0	46.9	706.0	778.0	45.4	36.0	36.0	318.0	317.0	50.2
102	22.0	22.0	160.0	173.0	46.2	377.0	476.0	39.6	37.0	38.0	298.0	338.0	44.1

103	25.0	25.0	195.0	208.0	46.9	605.0	778.0	38.9	35.0	35.0	301.0	307.0	49.0
104	24+2	25.0	195.0	208.0	46.9	728.0	778.0	46.8	36.0	36.0	278.0	317.0	43.8
105	23.0	23.0	177.0	185.0	47.8	539.0	565.0	47.7	36.0	36.0	289.0	317.0	45.6
106	21.0	21.0	163.0	162.0	50.3	434.0	398.0	54.5	39.0	39.0	301.0	350.0	43.0
107	20.0	20.0	138.0	150.0	46.0	261.0	330.0	39.5	35.0	35.0	311.0	307.0	50.7
108	25.0	25.0	195.0	208.0	46.9	759.0	778.0	48.8	37.0	37.0	287.0	328.0	43.8
109	21+3	22.0	153.0	173.0	44.2	430.0	476.0	45.2	38.0	38.0	288.0	338.0	42.6
110	25.0	25.0	195.0	208.0	46.9	645.0	778.0	41.5	37.0	37.0	294.0	328.0	44.8
111	23.0	23.0	183.0	185.0	49.5	625.0	565.0	55.3	34+3	35.0	305.0	307.0	49.7
112	22.0	22.0	153.0	173.0	44.2	356.0	476.0	37.4	35.0	36.0	305.0	317.0	48.1
113	23.0	23.0	174.0	185.0	47.0	632.0	565.0	55.9	35.0	36.0	289.0	317.0	45.6
114	21.0	21.0	151.0	162.0	46.6	377.0	398.0	47.4	39.0	40.0	254.0	363.0	35.0
115	23.0	23.0	159.0	185.0	43.0	530.0	565.0	46.9	35.0	35.0	333.0	307.0	54.2
116	23+6	24.0	160.0	197.0	40.6	442.0	665.0	33.2	36.0	36.0	312.0	317.0	49.2
117	23.0	24.0	138.0	197.0	35.0	290.0	665.0	21.8	39.0	39.0	354.0	350.0	50.6
118	20.0	20.0	100.0	150.0	33.3	444.0	330.0	67.3	35+6	36.0	319.0	317.0	50.3
119	21.0	21.0	188.0	162.0	58.0	604.0	398.0	75.9	37.0	37.0	335.0	328.0	51.1
120	25.0	25.0	198.0	208.0	47.6	514.0	778.0	33.0	35.0	37.0	330.0	328.0	50.3
121	21.3	22.0	140.0	173.0	40.5	455.0	476.0	47.8	39.0	40.0	263.0	363.0	36.2
122	23+3	24.0	162.0	197.0	41.1	353.0	665.0	26.5	36.0	36.0	322.0	317.0	50.8
123	23.0	23.0	176.0	185.0	47.6	400.0	565.0	35.4	37.0	37.0	336.0	328.0	51.2
124	23+5	24.0	250.0	197.0	63.5	400.0	665.0	30.1	36+3	37.0	325.0	328.0	49.5
125	24+4	25.0	195.0	208.0	46.9	660.0	778.0	42.4	36.0	36.0	321.0	317.0	50.6
126	22.0	22.0	195.0	173.0	56.4	450.0	476.0	47.3	37.0	38.0	294.0	338.0	43.5
127	24+4	25.0	150.0	208.0	36.1	353.0	778.0	22.7	37.0	37.0	333.0	328.0	50.8
128	25+4	25.0	189.0	208.0	45.4	390.0	778.0	25.1	35.0	35.0	313.0	307.0	51.0
129	22+3	22.0	135.0	173.0	39.0	300.0	476.0	31.5	38.0	38.0	300.0	338.0	44.4
130	23.0	23.0	135.0	185.0	36.5	320.0	565.0	28.3	39.0	40.0	329.0	363.0	45.3
131	21.0	21.0	195.0	162.0	60.2	480.0	398.0	60.3	36.0	36.0	288.0	317.0	45.4
132	24.0	24.0	200.0	197.0	50.8	389.0	665.0	29.2	39.0	39.0	321.0	350.0	45.9
133	21.0	21.0	195.0	162.0	60.2	510.0	398.0	64.1	36.0	36.0	332.0	317.0	52.4
134	25.0	25.0	153.0	208.0	36.8	360.0	778.0	23.1	35.0	35.0	247.0	307.0	40.2
135	24.0	24.0	180.0	197.0	45.7	423.0	665.0	31.8	36.0	36.0	286.0	317.0	45.1
136	22.0	22.0	196.0	173.0	56.6	590.0	476.0	62.0	36.0	36.0	301.0	317.0	47.5
137	22.0	22.0	195.0	173.0	56.4	668.0	476.0	70.2	35.0	35.0	298.0	307.0	48.5
138	20.0	20.0	154.0	150.0	51.3	450.0	330.0	68.2	37.0	37.0	303.0	328.0	46.2
139	24.0	24.0	156.0	197.0	39.6	300.0	665.0	22.6	37.0	37.0	254.0	328.0	38.7
140	20.0	20.0	154.0	150.0	51.3	380.0	330.0	57.6	39.0	39.0	222.0	350.0	31.7
141	21.0	21.0	175.0	162.0	54.0	598.0	398.0	75.1	39.0	39.0	254.0	350.0	36.3
142	22.0	22.0	165.0	173.0	47.7	545.0	476.0	57.2	35.0	35.0	325.0	307.0	52.9
143	23.0	23.0	128.0	185.0	34.6	376.0	565.0	33.3	40.0	40.0	340.0	363.0	46.8
144	25.0	25.0	146.0	208.0	35.1	582.0	778.0	37.4	37.0	37.0	321.0	328.0	48.9
145	21.0	21.0	158.0	162.0	48.8	426.0	398.0	53.5	38.0	38.0	333.0	338.0	49.3
146	23.0	23.0	195.0	185.0	52.7	684.0	565.0	60.5	39.0	40.0	341.0	363.0	47.0
147	23.0	23.0	195.0	185.0	52.7	695.0	565.0	61.5	37.0	37.0	321.0	328.0	48.9
148	21.0	21.0	123.0	162.0	38.0	520.0	398.0	65.3	40.0	40.0	358.0	363.0	49.3
149	20.0	20.0	154.0	150.0	51.3	513.0	330.0	77.7	39.0	39.0	325.0	350.0	46.4
150	22.0	22.0	158.0	173.0	45.7	658.0	476.0	69.1	35.0	35.0	302.0	307.0	49.2
151	22.0	22.0	143.0	173.0	41.3	350.0	476.0	36.8	37.0	37.0	302.0	328.0	46.0
152	23.0	23.0	146.0	185.0	39.5	480.0	565.0	42.5	40.0	40.0	301.0	363.0	41.5
153	22.0	22.0	155.0	173.0	44.8	520.0	476.0	54.6	38.0	38.0	278.0	338.0	41.1
154	23.0	23.0	198.0	185.0	53.5	628.0	565.0	55.6	35.0	35.0	289.0	307.0	47.1
155	23.0	23.0	198.0	185.0	53.5	519.0	565.0	45.9	36.0	36.0	302.0	317.0	47.6
156	20.0	20.0	145.0	150.0	48.3	364.0	330.0	55.2	39.0	39.0	314.0	350.0	44.9
157	25.0	25.0	155.0	208.0	37.3	523.0	778.0	33.6	39.0	39.0	331.0	350.0	47.3
158	20.0	20.0	143.0	150.0	47.7	517.0	330.0	78.3	37.0	37.0	295.0	328.0	45.0
159	25.0	25.0	169.0	208.0	40.6	356.0	778.0	22.9	35.0	35.0	345.0	307.0	56.2
160	22.0	22.0	158.0	173.0	45.7	498.0	476.0	52.3	36.0	36.0	354.0	317.0	55.8
161	24.0	24.0	146.0	197.0	37.1	522.0	665.0	39.2	36.0	36.0	312.0	317.0	49.2
162	23.0	23.0	186.0	185.0	50.3	655.0	565.0	58.0	40.0	40.0	299.0	363.0	41.2
163	22.0	22.0	195.0	173.0	56.4	726.0	476.0	76.3	39.0	40.0	330.0	363.0	45.5
164	20.0	20.0	185.0	150.0	61.7	541.0	330.0	82.0	40.0	40.0	325.0	363.0	44.8
165	22.0	22.0	195.0	173.0	56.4	523.0	476.0	54.9	36.0	36.0	325.0	317.0	51.3
166	20.0	20.0	199.0	150.0	66.3	589.0	330.0	89.2	39.0	39.0	327.0	350.0	46.7
167	24.0	24.0	154.0	197.0	39.1	628.0	665.0	47.2	38.0	38.0	354.0	338.0	52.4
168	20.0	20.0	201.0	150.0	67.0	483.0	330.0	73.2	37.0	37.0	298.0	328.0	45.4
169	25.0	25.0	165.0	208.0	39.7	521.0	778.0	33.5	37.0	37.0	330.0	328.0	50.3
170	24.0	24.0	162.0	197.0	41.1	569.0	665.0	42.8	37.0	38.0	303.0	338.0	44.8
171	23.0	23.0	145.0	185.0	39.2	269.0	565.0	23.8	37.0	37.0	299.0	328.0	45.6
172	22.0	22.0	195.0	173.0	56.4	755.0	476.0	79.3	36.0	36.0	296.0	317.0	46.7
173	20.0	20.0	192.0	150.0	64.0	350.0	330.0	53.0	36.0	36.0	322.0	317.0	50.8
174	22.0	22.0	191.0	173.0	55.2	817.0	476.0	85.8	40.0	40.0	352.0	363.0	48.5
175	22.0	22.0	195.0	173.0	56.4	706.0	476.0	74.2	38.0	38.0	300.0	338.0	44.4
176	23.0	23.0	237.0	185.0	64.1	386.0	565.0	34.2	37.0	37.0	312.0	328.0	47.6
177	22.0	22.0	195.0	173.0	56.4	455.0	476.0	47.8	36.0	36.0	302.0	317.0	47.6
178	24.0	24.0	170.0	197.0	43.1	539.0	665.0	40.5	39.0	39.0	314.0	350.0	44.9
179	22.0	22.0	175.0	173.0	50.6	613.0	476.0	64.4	36.0	36.0	312.0	317.0	49.2
180	23.0	23.0	159.0	185.0	43.0	520.0	565.0	46.0	37.0	37.0	321.0	328.0	48.9
181	22.0	22.0	195.0	173.0	56.4	729.0	476.0	76.6	38.0	38.0	333.0	338.0	49.3
182	20.0	20.0	201.0	150.0	67.0	335.0	330.0	50.8	36.0	36.0	289.0	317.0	45.6
183	20.0	20.0	195.0	150.0	65.0	356.0	330.0	53.9	38.0	38.0	298.0	338.0	44.1
184	20.0	20.0	195.0	150.0	65.0	365.0	330.0	55.3	35.0	35.0	302.0	307.0	49.2
185	22.0	22.0	191.0	173.0	55.2	650.0	476.0	68.3	40.0	40.0	331.0	363.0	45.6
186	25.0	25.0	197.0	208.0	47.4	800.0	778.0	51.4	40.0	40.0	330.0	363.0	45.5
187	22.0	22.0	178.0	173.0	51.4	511.0	476.0	53.7	37.0	37.0	304.0	328.0	46.3
188	23.0	23.0	132.0	185.0	35.7	252.0	565.0	22.3	39.0	39.0	302.0	350.0	43.1
189	22.0	22.0	245.0	173.0	70.8	453.0	476.0	47.6	40.0	40.0	300.0	363.0	41.3
190	24.0	24.0	235.0	197.0	59.6	689.0	665.0	51.8	36.0	36.0	298.0	317.0	47.0
191	22.0	22.0	135.0	173.0	39.0	309.0	476.0	32.5	37.0	37.0	278.0	328.0	42.4
192	20.0	20.0	160.0	150.0	53.3	355.0	330.0	53.8	36.0	36.0	300.0	317.0	47.3
193	22.0	22.0	167.0	173.0	48.3	470.0	476.0	49.4	38.0	38.0	320.0	338.0	47.3
194	25.0	25.0	166.0	208.0	39.9	405.0	778.0	26.0	37.0	37.0	354.0	328.0	54.0
195	23.0	23.0	155.0	185.0	41.9	355.0	565.0	31.4	40.0	40.0	300.0	363.0	41.3
196	24.0	24.0	175.0	197.0	44.4	520.0	665.0	39.1	39.0	39.0	289.0	350.0	41.3
197	20.0	20.0	153.0	150.0	51.0	428.0	330.0	64.8	36.0	36.0	301.0	317.0	47.5
198	24.0	24.0	146.0	197.0	37.1	300.0	665.0	22.6	35.0	35.0	300.0	307.0	48.9
199	20.0	21.0	193.0	154.0	62.7	743.0	398.0	93.3	39+5	40.0	358.0	363.0	49.3
200	20.0	20.0	150.0	150.0	50.0	353.0	330.0	53.5	36.0	37.0	268.0	328.0	40.9

SR NO.	EFW 3RD (USG)	EFW3RD (STD)	PERCENTAGE	UAPI	MCAPI	CP RATIO	EPIDURAL	LABOUR SPONTANEOUS	INDUCED	LIQUOR	CTG	OXYTOCIN	PPH	FTND	LSCS
1	3205.0	3083.0	52.0	1.0	1.1	1.1	2	2	2	2	2	1	2	2	1
2	2829.0	2383.0	59.4	1.2	1.7	1.4	2	1	2	2	2	1	2	1	2
3	2752.0	3083.0	44.6	0.9	1.0	1.1	2	1	2	2	2	1	2	1	2
4	3482.0	3462.0	50.3	0.8	1.1	1.3	2	2	2	2	2	1	2	2	1
5	3214.0	3288.0	48.9	1.0	1.2	1.2	2	2	2	2	2	1	2	2	1
6	3282.0	3288.0	49.9	0.5	1.2	2.2	2	2	2	2	2	1	2	2	1
7	3484.0	3288.0	53.0	0.9	1.7	1.9	2	1	2	2	2	1	2	1	2
8	3526.0	3288.0	53.6	0.9	1.1	1.2	2	2	2	2	2	1	2	2	1
9	3212.0	3288.0	48.8	1.2	0.5	0.5	2	2	2	2	1	1	2	2	1
10	2140.0	2859.0	37.4	0.9	1.3	1.5	2	1	2	2	2	1	2	1	2
11	2704.0	2622.0	51.6	0.9	1.4	1.5	2	1	2	1	2	1	2	2	1
12	3484.0	3288.0	53.0	0.9	1.7	1.9	2	1	2	2	2	1	1	1	2
13	2273.0	2622.0	43.3	1.2	1.5	1.3	2	2	1	2	1	1	2	2	1
14	2202.0	2859.0	38.5	0.5	1.0	2.0	2	2	2	2	2	1	2	2	1
15	2119.0	2622.0	40.4	1.1	1.8	1.6	2	2	2	2	2	1	2	2	1
16	1850.0	2622.0	35.3	0.9	1.2	1.3	2	2	2	2	2	1	2	2	1
17	2270.0	2859.0	39.7	0.9	1.5	1.7	2	2	2	2	2	1	2	2	1
18	2194.0	2622.0	41.8	0.9	1.4	1.6	2	2	2	2	2	1	2	2	1
19	3540.0	3462.0	51.1	0.9	1.5	1.7	2	2	2	2	2	1	2	1	2
20	3500.0	3462.0	50.5	0.8	1.3	1.7	2	2	2	2	2	1	2	2	1
21	2952.0	3288.0	44.9	0.5	1.1	2.1	2	2	1	2	2	1	2	1	2
22	1850.0	2622.0	35.3	0.9	1.2	1.4	2	2	2	2	2	1	2	1	2
23	2394.0	3083.0	38.8	0.9	1.1	1.2	2	2	2	2	2	1	2	2	1
24	2250.0	2859.0	39.3	0.5	1.1	2.2	2	2	2	2	2	1	2	2	1
25	3210.0	3083.0	52.1	0.5	1.2	2.5	2	2	2	2	2	1	2	2	1
26	2653.0	2622.0	50.6	1.1	1.5	1.3	2	2	2	2	2	1	2	2	1
27	2563.0	2383.0	53.8	1.1	1.5	1.4	2	2	2	2	2	1	2	2	1
28	2194.0	2622.0	41.8	0.8	1.4	1.8	2	2	2	2	2	1	2	2	1
29	2475.0	2622.0	47.2	1.2	1.5	1.3	2	2	2	2	2	1	2	2	1
30	1885.0	2622.0	35.9	0.5	1.5	2.8	2	2	2	2	2	1	2	2	1
31	2532.0	2859.0	44.3	0.8	1.6	1.9	2	2	2	2	2	1	2	2	1
32	2462.0	2622.0	46.9	0.6	1.5	2.3	2	2	2	2	2	1	2	2	1
33	2864.0	2622.0	54.6	0.8	1.6	1.9	2	2	2	2	2	1	2	2	1
34	2333.0	2622.0	44.5	1.2	1.7	1.4	2	2	2	2	2	1	2	1	2
35	2733.0	2622.0	52.1	1.2	1.6	1.3	2	2	2	2	2	1	2	2	1
36	1780.0	2383.0	37.3	1.1	1.4	1.3	2	2	2	2	2	1	2	1	2
37	2483.0	2622.0	47.3	0.9	1.4	1.6	2	2	2	2	2	1	2	2	1
38	2926.0	2859.0	51.2	0.5	1.5	3.3	2	2	2	2	2	1	2	1	2
39	2958.0	2622.0	56.4	0.5	1.5	3.1	2	2	2	2	2	1	2	2	1
40	2895.0	2383.0	60.7	1.2	1.5	1.3	2	2	2	2	2	1	2	2	1
41	2772.0	2622.0	52.9	1.1	1.4	1.3	2	2	2	2	2	1	2	1	2
42	3114.0	3288.0	47.4	0.5	1.5	2.9	2	2	2	2	2	1	2	2	1
43	3120.0	3083.0	50.6	1.2	1.5	1.2	2	2	2	2	2	1	2	2	1
44	3058.0	2859.0	53.5	0.4	1.5	3.8	2	2	2	2	2	1	2	2	1
45	2694.0	2383.0	56.5	1.1	1.5	1.4	2	2	2	2	2	1	2	2	1
46	2564.0	3083.0	41.6	0.6	1.8	3.2	2	2	2	2	2	1	2	1	2
47	2532.0	2383.0	53.1	0.6	1.6	2.7	2	2	2	2	2	1	2	1	2
48	2505.0	2622.0	47.8	0.5	1.5	2.9	2	2	2	2	2	1	2	2	1
49	3251.0	3288.0	49.4	0.6	1.5	2.7	2	2	2	1	2	1	2	1	2
50	2586.0	2383.0	54.3	1.1	1.5	1.3	2	2	2	2	2	1	2	1	2
51	2553.0	2859.0	44.6	0.6	1.5	2.5	2	2	2	2	2	1	2	1	2
52	2423.0	2622.0	46.2	0.7	1.3	1.9	2	2	2	2	2	1	2	1	2
53	2486.0	3083.0	40.3	1.2	1.5	1.3	2	2	2	2	2	1	2	1	2
54	2685.0	3083.0	43.5	1.1	1.4	1.3	2	2	2	1	2	1	2	1	2
55	2462.0	2622.0	46.9	0.7	1.1	1.7	2	2	1	2	1	1	2	1	2
56	2123.0	2622.0	40.5	1.1	1.7	1.5	2	2	2	1	2	1	2	1	2
57	2459.0	3083.0	39.9	0.8	1.7	2.1	2	2	2	2	2	1	2	1	2
58	2755.0	2383.0	57.8	1.1	1.4	1.3	2	2	2	2	2	1	2	2	1
59	2278.0	2622.0	43.4	0.9	1.4	1.6	2	2	2	2	2	1	2	2	1
60	2694.0	2622.0	51.4	0.9	1.5	1.6	2	2	2	2	2	1	2	2	1
61	2689.0	3083.0	43.6	0.8	1.6	2.1	2	2	2	2	2	1	2	2	1
62	2435.0	3083.0	39.5	1.0	1.6	1.6	2	2	2	2	2	1	2	2	1
63	2102.0	2383.0	44.1	1.1	1.4	1.3	2	2	2	2	2	1	2	1	2
64	2521.0	3083.0	40.9	1.3	1.7	1.3	2	2	2	2	2	1	2	1	2
65	2568.0	2383.0	53.9	0.8	1.1	1.3	2	2	2	2	2	1	2	2	1
66	2689.0	2859.0	47.0	1.1	1.5	1.3	2	2	2	2	2	1	2	1	2
67	2880.0	2859.0	50.4	0.6	1.6	2.8	2	2	2	2	2	1	2	1	2
68	2566.0	3288.0	39.0	1.0	1.4	1.5	2	2	2	2	2	1	2	1	2
69	2565.0	2383.0	53.8	0.6	1.6	2.5	2	2	2	2	2	1	2	1	2
70	1998.0	3083.0	32.4	1.1	1.5	1.3	2	2	2	2	2	1	2	1	2
71	2749.0	3083.0	44.6	1.2	1.5	1.2	2	2	2	2	2	1	2	2	1
72	2156.0	2383.0	45.2	1.2	1.8	1.5	2	2	2	2	2	1	2	1	2
73	1327.0	2622.0	25.3	0.7	1.2	1.7	2	2	2	2	2	1	2	1	2
74	2955.0	3288.0	44.9	0.7	1.6	2.2	2	2	2	2	2	1	2	1	2
75	2330.0	2383.0	48.9	1.0	1.8	1.8	2	2	2	2	2	1	2	1	2
76	1923.0	2859.0	33.6	0.9	1.4	1.6	2	2	2	2	2	1	2	1	2
77	2155.0	2383.0	45.2	0.8	1.1	1.3	2	2	2	2	2	1	2	2	1
78	2135.0	2383.0	44.8	0.8	1.6	1.9	2	2	2	2	2	1	2	1	2
79	2569.0	3083.0	41.7	1.2	1.5	1.2	2	2	2	1	2	1	2	1	2
80	2453.0	2859.0	42.9	1.2	1.6	1.3	2	2	2	2	2	1	2	1	2
81	2935.0	3288.0	44.6	1.2	1.2	1.0	2	2	2	2	2	1	2	1	2
82	2769.0	3288.0	42.1	0.9	1.2	1.4	2	2	2	2	2	1	2	1	2
83	2678.0	2383.0	56.2	0.9	1.2	1.3	2	2	2	2	2	1	2	2	1
84	2866.0	2383.0	60.1	0.9	1.2	1.4	2	2	2	2	2	1	2	1	2
85	3454.0	3288.0	52.5	0.7	1.5	2.1	2	2	2	2	2	1	1	1	2
86	2564.0	3462.0	37.0	1.4	1.5	1.1	2	2	1	2	2	1	2	1	2
87	2784.0	2383.0	58.4	0.6	1.6	2.8	2	2	2	2	2	1	2	1	2
88	3018.0	3288.0	45.9	1.2	1.6	1.3	2	2	2	2	2	1	2	2	1
89	2862.0	2859.0	50.1	0.5	1.2	2.2	2	2	2	2	2	1	2	2	1
90	2101.0	2383.0	44.1	0.6	1.5	2.3	2	2	2	2	2	1	2	1	2
91	1693.0	2383.0	35.5	0.7	1.4	2.1	2	2	2	2	2	1	2	1	2
92	3306.0	3083.0	53.6	1.1	1.6	1.5	2	2	2	2	2	1	2	1	2
93	1853.0	2859.0	32.4	1.1	1.7	1.5	2	2	2	2	2	1	2	2	1
94	3635.0	3288.0	55.3	0.6	1.1	1.7	2	2	2	2	2	1	2	1	2
95	2694.0	2622.0	51.4	0.8	1.4	1.7	2	2	2	2	2	1	2	1	2
96	3221.0	3083.0	52.2	1.1	1.6	1.4	2	2	2	2	2	1	2	1	2
97	3152.0	3288.0	47.9	1.4	1.6	1.2	2	2	2	2	2	1	2	1	2
98	1650.0	2622.0	31.5	1.2	1.6	1.3	2	2	2	2	2	1	2	1	2
99	2689.0	3083.0	43.6	1.1	1.4	1.3	2	2	2	1	2	2	1	2	1
100	3190.0	3083.0	51.7	1.2	1.8	1.5	2	2	2	2	2	1	2	1	2
101	2694.0	2622.0	51.4	0.8	1.4	1.8	2	2	2	2	2	1	2	2	1
102	2173.0	3083.0	35.2	0.9	1.5	1.6	2	2	2	2	2	1	2	1	2

103	1486.0	2383.0	31.2	0.8	1.5	1.9	2	2	2	2	2	1	2	1	2
104	2423.0	2622.0	46.2	0.9	1.6	1.8	2	2	2	2	2	1	2	1	2
105	2512.0	2622.0	47.9	1.1	1.4	1.3	2	2	2	2	2	1	2	1	2
106	2458.0	3288.0	37.4	1.0	1.8	1.8	2	2	2	2	2	1	2	1	2
107	2105.0	2383.0	44.2	0.6	2.3	3.5	2	2	2	2	2	1	2	1	2
108	1562.0	2859.0	27.3	1.1	1.8	1.6	2	2	2	2	2	1	2	1	2
109	2698.0	3083.0	43.8	0.9	2.1	2.3	2	2	2	2	2	1	2	2	1
110	2562.0	2859.0	44.8	1.4	1.6	1.1	2	2	2	2	2	1	2	1	2
111	2388.0	2383.0	50.1	1.1	1.5	1.4	2	2	2	2	2	1	2	2	1
112	2035.0	2622.0	38.8	1.0	1.6	1.6	2	2	2	1	2	1	2	1	2
113	1580.0	2622.0	30.1	1.1	1.6	1.5	2	2	2	2	2	1	2	2	1
114	1529.0	3462.0	22.1	1.5	1.6	1.1	2	2	2	2	1	1	2	1	2
115	2521.0	2383.0	52.9	0.8	1.1	1.4	2	2	2	2	2	1	2	1	2
116	2154.0	2622.0	41.1	0.9	1.8	2.0	2	2	2	2	2	1	2	1	2
117	2952.0	3288.0	44.9	1.2	1.9	1.6	2	2	2	2	2	1	2	1	2
118	2568.0	2622.0	49.0	1.3	1.6	1.2	2	2	2	2	2	1	2	1	2
119	2212.0	2859.0	38.7	1.1	1.5	1.4	2	2	2	2	2	1	2	2	1
120	3015.0	2859.0	52.7	1.1	1.6	1.5	2	2	2	2	2	1	2	2	1
121	2752.0	3462.0	39.7	1.2	1.3	1.1	2	2	1	2	2	1	2	2	1
122	2935.0	2622.0	56.0	0.8	1.5	1.9	2	2	2	2	2	1	2	2	1
123	3097.0	2859.0	54.2	1.3	1.5	1.2	2	2	2	2	2	1	2	1	2
124	2985.0	2859.0	52.2	1.2	1.6	1.3	2	2	2	2	2	1	2	1	2
125	2930.0	2622.0	55.9	1.1	1.6	1.5	2	2	2	2	2	1	2	1	2
126	2050.0	3083.0	33.2	0.8	1.5	1.8	2	2	2	2	2	1	2	1	2
127	3157.0	2859.0	55.2	0.8	1.5	1.9	2	2	2	2	2	1	2	1	2
128	2625.0	2383.0	55.1	0.9	1.6	1.8	2	2	2	2	2	1	2	1	2
129	2568.0	3083.0	41.6	1.1	1.4	1.2	2	2	2	1	2	1	2	1	2
130	3056.0	3462.0	44.1	0.9	2.0	2.3	2	2	2	2	2	1	2	2	1
131	1468.0	2622.0	28.0	1.1	1.6	1.5	2	2	2	2	2	1	2	1	2
132	3202.0	3288.0	48.7	1.1	1.5	1.4	2	2	2	2	2	1	2	1	2
133	1985.0	2622.0	37.9	0.9	1.2	1.4	2	2	2	2	2	1	2	2	1
134	1892.0	2383.0	39.7	0.8	1.2	1.5	2	2	2	2	2	1	2	1	2
135	1956.0	2622.0	37.3	0.9	1.6	1.8	2	2	2	2	2	1	2	1	2
136	1652.0	2622.0	31.5	0.9	1.8	2.1	2	2	2	2	1	1	2	1	2
137	1359.0	2383.0	28.5	1.2	1.4	1.2	2	2	2	2	2	1	2	1	2
138	2658.0	2859.0	46.5	1.0	1.3	1.3	2	2	2	2	2	1	2	1	2
139	2489.0	2859.0	43.5	1.1	1.6	1.5	2	2	2	1	2	1	2	2	1
140	2165.0	3288.0	32.9	1.3	1.5	1.2	2	2	2	2	2	1	2	1	2
141	3025.0	3288.0	46.0	1.1	1.6	1.5	2	2	2	2	2	1	2	1	2
142	1950.0	2383.0	40.9	1.0	1.2	1.2	2	2	2	2	2	1	2	2	1
143	2985.0	3462.0	43.1	1.2	1.3	1.1	2	2	2	2	2	1	2	2	1
144	1865.0	2859.0	32.6	1.1	1.2	1.1	2	2	2	2	2	1	2	1	2
145	2102.0	3083.0	34.1	1.2	1.5	1.2	2	2	2	2	2	1	2	1	2
146	3526.0	3462.0	50.9	1.0	1.5	1.5	2	2	2	2	2	1	2	1	2
147	2690.0	2859.0	47.0	1.2	1.5	1.2	2	2	2	2	2	1	2	2	1
148	2132.0	3462.0	30.8	1.7	1.6	0.9	2	2	2	2	2	1	2	1	2
149	2985.0	3288.0	45.4	1.5	1.5	1.0	2	2	2	2	2	1	2	2	1
150	1335.0	2383.0	28.0	0.9	1.6	1.8	2	2	1	2	2	1	2	1	2
151	2895.0	2859.0	50.6	1.0	1.2	1.2	2	2	2	2	2	1	2	1	2
152	2785.0	3462.0	40.2	1.0	1.2	1.3	2	2	2	2	2	1	2	2	1
153	2785.0	3083.0	45.2	1.1	1.2	1.1	2	2	2	2	2	1	2	2	1
154	1776.0	2383.0	37.3	0.9	1.5	1.7	2	2	2	2	2	1	2	1	2
155	2015.0	2622.0	38.4	1.0	1.5	1.6	2	2	2	2	2	1	2	1	2
156	2788.0	3288.0	42.4	1.0	1.2	1.2	2	2	2	2	2	1	2	2	1
157	3198.0	3288.0	48.6	1.4	1.7	1.2	2	2	2	2	2	1	2	1	2
158	2456.0	2859.0	43.0	1.0	1.5	1.5	2	2	2	2	2	1	2	1	2
159	1412.0	2383.0	29.6	1.2	1.4	1.2	2	2	2	2	2	1	2	1	2
160	2541.0	2622.0	48.5	1.0	1.3	1.3	2	2	2	1	2	1	2	1	2
161	1452.0	2622.0	27.7	1.0	1.6	1.7	2	2	2	2	2	1	2	1	2
162	3285.0	3462.0	47.4	1.2	1.5	1.2	2	2	2	2	2	1	2	1	2
163	2015.0	3462.0	29.1	1.4	1.5	1.1	2	2	2	2	1	1	2	1	2
164	2986.0	3462.0	43.1	1.4	1.5	1.1	2	2	2	2	2	1	2	1	2
165	2652.0	2622.0	50.6	1.0	1.3	1.3	2	2	2	2	2	1	2	1	2
166	3098.0	3288.0	47.1	1.0	1.3	1.3	2	2	2	2	2	1	2	1	2
167	2568.0	3083.0	41.6	1.4	1.5	1.1	2	2	2	2	2	1	2	1	2
168	2552.0	2859.0	44.6	1.2	1.4	1.2	2	2	2	2	2	1	2	1	2
169	3501.0	2859.0	61.2	1.0	1.5	1.6	2	2	2	2	2	1	2	2	1
170	2350.0	3083.0	38.1	1.1	1.3	1.2	2	2	2	2	2	1	2	1	2
171	1598.0	2859.0	27.9	1.1	1.6	1.4	2	2	2	2	2	1	2	1	2
172	2487.0	2622.0	47.4	1.2	1.5	1.3	2	2	2	2	2	1	2	1	2
173	2645.0	2622.0	50.4	0.9	1.5	1.7	2	2	2	2	2	1	2	2	1
174	2801.0	3462.0	40.5	1.2	1.5	1.3	2	2	2	2	2	1	2	1	2
175	3025.0	3083.0	49.1	1.1	1.2	1.1	2	2	2	2	2	1	2	1	2
176	2156.0	2859.0	37.7	1.2	1.5	1.3	2	2	2	2	2	1	2	1	2
177	2195.0	2622.0	41.9	0.8	1.2	1.4	2	2	2	2	2	1	2	1	2
178	2935.0	3288.0	44.6	1.2	1.5	1.3	2	2	2	2	2	1	2	1	2
179	1398.0	2622.0	26.7	1.2	1.7	1.4	2	2	2	1	2	1	2	1	2
180	2365.0	2859.0	41.4	1.1	1.6	1.4	2	2	2	2	2	1	2	1	2
181	1985.0	3083.0	32.2	0.8	1.3	1.6	2	2	2	2	2	1	2	1	2
182	2145.0	2622.0	40.9	1.1	1.5	1.4	2	2	2	2	2	1	2	2	1
183	2658.0	3083.0	43.1	0.9	1.1	1.2	2	2	2	2	2	1	2	1	2
184	1865.0	2383.0	39.1	1.2	1.2	1.0	2	2	2	2	2	1	2	1	2
185	1985.0	3462.0	28.7	0.9	1.7	1.8	2	2	2	2	2	1	2	1	2
186	3562.0	3462.0	51.4	1.0	1.1	1.1	2	2	2	2	2	1	2	1	2
187	1689.0	2859.0	29.5	0.9	1.5	1.7	2	2	2	2	2	1	2	1	2
188	3256.0	3288.0	49.5	0.8	1.0	1.2	2	2	2	2	2	1	2	2	1
189	3169.0	3462.0	45.8	1.0	1.1	1.1	2	2	2	2	2	1	2	1	2
190	2365.0	2622.0	45.1	0.8	1.2	1.5	2	2	2	1	2	1	2	1	2
191	2785.0	2859.0	48.7	1.1	1.2	1.1	2	2	2	2	2	1	2	1	2
192	1657.0	2622.0	31.6	1.0	1.7	1.7	2	2	2	2	2	1	2	2	1
193	2985.0	3083.0	48.4	1.1	1.5	1.4	2	2	1	2	2	1	2	1	2
194	2985.0	2859.0	52.2	1.0	1.5	1.5	2	2	2	2	2	1	2	1	2
195	2162.0	3462.0	31.2	1.1	1.3	1.2	2	2	2	2	2	1	2	1	2
196	3056.0	3288.0	46.5	1.1	1.3	1.2	2	2	2	2	2	1	2	1	2
197	2548.0	2622.0	48.6	0.9	1.7	1.9	2	2	2	2	2	1	2	2	1
198	1885.0	2383.0	39.6	0.8	1.3	1.6	2	2	2	2	2	1	2	1	2
199	3573.0	3462.0	51.6	1.1	1.2	1.1	2	2	2	2	2	1	2	1	2
200	1580.0	2859.0	27.6	1.1	1.5	1.4	2	2	2	2	2	1	2	1	2

SR NO.	BWT	INSTRUMENT	APGAR (5)	APGAR (10)	NICU	FGR	HB	TOTAL COUNT	PLATELETS	BLOOD GROUP	RD
1	2.7	2	7	9	2	SGA	14.4	13850	2.13	O	POSITIVE
2	2.2	2	7	9	0	SGA	14	12800	1.15	B	POSITIVE
3	2.5	2	7	9	0	SGA	9.4	9720	2.6	A	POSITIVE
4	3	2	7	9	2	AGA	9	8500	2.1	B	POSITIVE
5	2.8	2	7	9	2	SGA	8.4	8764	0.9	B	POSITIVE
6	3.3	2	7	9	0	AGA	9.8	10840	1.1	B	POSITIVE
7	3.2	2	7	9	5	AGA	8.6	8900	2.63	B	POSITIVE
8	3.1	2	7	9	0	AGA	10.4	11840	1.72	O	POSITIVE
9	2.8	2	6	9	9	SGA	11.2	11000	1.74	B	POSITIVE
10	2.7	2	7	9	0	AGA	12.4	9840	1.7	A	POSITIVE
11	2.2	2	7	9	0	AGA	12.1	12500	2.2	B	POSITIVE
12	3.2	2	7	9	5	AGA	8.6	8900	2.63	O	POSITIVE
13	2.2	2	7	9	3	SGA	12.1	8720	1.9	A	POSITIVE
14	2.42	2	7	9	6	AGA	10.7	17390	2.23	B	POSITIVE
15	2.1	2	6	9	7	AGA	12	13180	3.24	O	POSITIVE
16	1.8	2	7	9	2	SGA	11.6	19150	2.45	A	POSITIVE
17	2.4	2	7	9	3	AGA	11.8	11310	2.62	B	POSITIVE
18	2.1	2	7	9	5	AGA	12.7	22440	1.54	B	POSITIVE
19	3.12	1	7	9	5	AGA	9.4	10850	1.5	A	POSITIVE
20	2.9	2	7	9	0	AGA	10.5	8700	2.55	O	POSITIVE
21	2.65	2	7	9	0	AGA	11	15232	1.23	A	POSITIVE
22	1.8	2	7	9	8	SGA	11.7	21140	2.89	AB	POSITIVE
23	2.5	2	7	9	0	SGA	11	10250	1.64	O	POSITIVE
24	2.45	2	7	9	0	AGA	10.5	11110	1.47	AB	POSITIVE
25	3.3	2	7	9	2	AGA	11.1	8600	1.19	B	POSITIVE
26	2.5	2	7	9	3	AGA	8.4	12500	2.04	O	NEGATIVE
27	2.2	2	7	9	0	SGA	10.8	10600	3.71	B	POSITIVE
28	2	2	7	9	5	AGA	11.2	19420	1.94	B	NEGATIVE
29	2.3	2	7	9	0	SGA	8.8	13940	4.96	O	POSITIVE
30	1.8	2	7	9	9	AGA	11.7	8200	1.25	B	POSITIVE
31	2.8	2	7	9	2	AGA	10.2	11600	3.3	O	POSITIVE
32	2.4	2	7	9	3	AGA	7.8	13700	1.91	AB	POSITIVE
33	2.8	2	7	9	0	AGA	4.8	15600	2.63	A	POSITIVE
34	2.5	1	7	9	5	AGA	12.2	12777	3.12	AB	POSITIVE
35	2.3	2	7	9	0	SGA	12	8700	3.9	O	POSITIVE
36	1.9	2	7	9	2	SGA	11.8	8370	1.07	B	POSITIVE
37	2.4	2	7	9	0	AGA	11.1	17510	2.09	O	NEGATIVE
38	3.1	2	7	9	1	AGA	10.2	14380	3.11	B	POSITIVE
39	2.8	2	7	9	0	AGA	8.2	15480	2.13	O	POSITIVE
40	2.4	2	7	9	0	AGA	8.3	15816	2.25	A	POSITIVE
41	2.2	2	7	9	1	SGA	12.7	6850	2.17	B	POSITIVE
42	2.8	2	7	9	0	AGA	12.6	18400	1.6	B	POSITIVE
43	2.7	2	7	9	0	SGA	10	15460	1.2	A	POSITIVE
44	3.2	2	7	9	1	AGA	11.2	14658	1.2	AB	POSITIVE
45	1.8	2	7	9	8	SGA	11.2	12870	2.26	B	POSITIVE
46	2.7	2	7	9	0	AGA	12.2	10800	2	A	POSITIVE
47	2.8	2	7	9	1	AGA	11.8	20866	3.04	O	POSITIVE
48	2.5	2	7	9	6	AGA	11	14340	3.42	B	POSITIVE
49	3.5	2	7	9	2	AGA	9.6	14160	2.13	A	POSITIVE
50	2	2	7	9	1	SGA	12.2	13156	2.25	AB	POSITIVE
51	2.7	2	7	9	0	AGA	9.8	13580	1.72	A	POSITIVE
52	2.4	2	7	9	0	AGA	10.2	14200	1.56	AB	POSITIVE
53	2.6	2	7	9	0	AGA	12.5	12300	2.14	B	POSITIVE
54	2.7	2	7	9	1	AGA	14.1	14223	2.15	B	POSITIVE
55	2.5	2	7	9	6	AGA	8.8	9856	2.47	A	POSITIVE
56	2.1	2	7	9	0	AGA	9.6	8444	1.56	O	POSITIVE
57	2.6	2	7	9	0	AGA	9.4	8600	1.4	AB	POSITIVE
58	2.1	2	7	9	6	SGA	13.3	16360	1.67	O	POSITIVE
59	2	2	7	9	0	AGA	13.8	11910	2.11	O	POSITIVE
60	2.6	2	7	9	0	AGA	8.2	10520	1.8	O	POSITIVE
61	2.8	2	7	9	0	AGA	11.8	11550	2.3	AB	POSITIVE
62	2.6	2	7	9	0	AGA	9	9290	2.39	O	NEGATIVE
63	2.2	2	7	9	0	SGA	12	10235	2.2	AB	POSITIVE
64	2.6	2	7	9	0	AGA	7.5	8230	1.69	B	POSITIVE
65	2.1	2	7	9	0	SGA	12.3	15880	3.19	B	POSITIVE
66	2.52	2	7	9	0	SGA	9.8	12300	1.5	A	POSITIVE
67	3.1	2	7	9	0	AGA	9.2	14520	2.5	A	POSITIVE
68	2.9	2	7	9	0	AGA	10.5	12011	1.2	A	POSITIVE
69	2.6	2	7	9	1	AGA	10.8	11500	3	O	POSITIVE
70	2.5	2	7	9	0	AGA	9.9	12000	2.4	B	POSITIVE
71	2.5	2	7	9	2	SGA	11.1	9860	3.06	A	POSITIVE
72	2.4	2	7	9	1	AGA	11.3	7790	2.62	B	POSITIVE
73	2.3	2	7	9	8	AGA	12	15230	2.5	A	POSITIVE
74	3.3	1	7	9	0	AGA	9.5	7860	3.43	A	POSITIVE
75	2.4	2	7	9	0	AGA	8.9	7410	2.42	B	POSITIVE
76	2.2	2	7	9	1	AGA	8.7	2050	0.32	B	POSITIVE
77	2.2	2	7	9	0	SGA	11.8	8502	1.9	O	POSITIVE
78	2.4	2	7	9	0	AGA	10	14230	3.2	A	POSITIVE
79	2.8	2	7	9	0	AGA	8.8	15140	0.6	B	POSITIVE
80	2.5	2	7	9	1	SGA	7.8	8800	1.7	B	POSITIVE
81	3.1	2	7	9	2	AGA	12.2	9000	2.27	B	NEGATIVE
82	3.3	2	7	9	0	AGA	8.6	9505	1.9	A	POSITIVE
83	2.1	2	5	9	8	SGA	12.5	11930	1.52	O	POSITIVE
84	2.1	2	7	9	1	SGA	11.4	13250	2.1	A	POSITIVE
85	3.3	2	7	9	1	AGA	12	15340	2.73	A	POSITIVE
86	2.9	2	7	9	0	SGA	9.8	8720	2.49	B	POSITIVE
87	2.8	2	7	9	0	AGA	5.6	15500	3.28	A	POSITIVE
88	2.8	2	7	9	0	AGA	11.6	9390	1.6	B	POSITIVE
89	3.1	2	7	9	0	AGA	8.4	8760	0.91	B	POSITIVE
90	2.5	2	7	9	0	AGA	11.2	13200	3	O	POSITIVE
91	2.3	2	7	9	0	AGA	8.7	2050	0.32	B	POSITIVE
92	3.5	2	7	9	2	AGA	11.2	13290	2.52	A	POSITIVE
93	3	2	7	9	9	AGA	10	11000	3.2	A	POSITIVE
94	3.5	2	7	9	2	AGA	9.2	21000	1.2	B	POSITIVE
95	2.6	2	7	9	0	AGA	14.1	13560	1.74	O	POSITIVE
96	3.3	2	7	9	0	AGA	12.8	13650	2.49	O	POSITIVE
97	2.9	2	7	9	0	SGA	10.1	10900	1.56	A	POSITIVE
98	2.6	2	7	9	5	AGA	8.7	9560	1.58	B	POSITIVE
99	2.7	2	7	9	0	AGA	7.5	8230	1.69	B	POSITIVE
100	3.3	2	7	9	0	AGA	11.8	13870	1.74	B	POSITIVE
101	2.6	2	7	9	0	AGA	8.2	15246	1.5	A	POSITIVE
102	2.3	2	7	9	2	AGA	8.9	14823	1.2	AB	POSITIVE
103	2.3	2	7	9	9	AGA	10	9867	0.9	B	POSITIVE

104	2.4	2	7	9	0	AGA	11	14000	1.5	O	POSITIVE
105	2.3	2	7	9	0	SGA	9.5	15426	1	A	POSITIVE
106	3.4	2	7	9	5	LGA	10.8	12080	1.75	A	POSITIVE
107	2.3	2	7	9	2	AGA	10.8	13310	2.34	AB	POSITIVE
108	3.1	2	7	9	8	AGA	9	9863	2.3	AB	POSITIVE
109	2.8	2	7	9	2	AGA	10	9854	2.2	O	POSITIVE
110	2.5	1	7	9	0	SGA	9	11021	2.6	O	POSITIVE
111	2.4	2	7	9	2	AGA	11	16300	3.14	B	POSITIVE
112	2.1	2	7	9	0	AGA	12	15422	1.2	A	POSITIVE
113	2.1	2	7	9	9	AGA	10.3	10130	0.98	O	POSITIVE
114	2.8	2	5	8	11	SGA	12	8579	1.5	AB	POSITIVE
115	2.1	2	7	9	6	SGA	11.3	7790	2.62	A	POSITIVE
116	2	2	7	9	0	AGA	11	10190	2.96	A	POSITIVE
117	3	2	7	9	0	AGA	3.9	9390	1.6	B	POSITIVE
118	2	2	7	9	5	SGA	10.6	11550	2.31	AB	POSITIVE
119	2.5	2	7	9	0	AGA	10.6	7820	2.04	O	POSITIVE
120	2.6	2	7	9	0	AGA	13.6	11400	1.64	O	POSITIVE
121	3.2	2	7	9	0	AGA	11.8	16070	1.91	O	POSITIVE
122	2.8	2	7	9	0	AGA	12.2	7680	2.75	O	POSITIVE
123	2.5	2	7	9	0	SGA	11.8	11810	2.12	A	POSITIVE
124	2.5	2	7	9	2	SGA	12.3	13440	3.23	B	POSITIVE
125	2.8	2	7	9	3	AGA	11.4	10790	2.53	A	POSITIVE
126	2.3	2	7	9	0	AGA	9.8	8930	2.36	O	POSITIVE
127	3.36	2	7	9	0	AGA	11.6	8960	1.69	AB	POSITIVE
128	2.4	2	7	9	5	AGA	9.1	10420	2.59	O	POSITIVE
129	2.6	2	7	9	2	SGA	8.2	11360	1.94	A	POSITIVE
130	3	2	7	9	2	AGA	13.5	12310	2.32	AB	POSITIVE
131	2.5	2	7	9	8	AGA	9.6	7859	2.2	A	POSITIVE
132	2.7	2	7	9	0	AGA	9	10210	0.98	B	POSITIVE
133	2	2	7	9	2	AGA	11	11542	1.6	O	POSITIVE
134	2.5	2	7	9	2	AGA	9	12045	2.3	AB	POSITIVE
135	2.1	2	7	9	0	AGA	9	10004	1.56	B	POSITIVE
136	2.8	2	7	9	12	AGA	12	12544	1.2	O	POSITIVE
137	2.2	2	7	9	11	SGA	10.7	15040	2.38	B	POSITIVE
138	2.5	2	7	9	0	SGA	10	4587	1.25	B	POSITIVE
139	2.4	2	7	9	0	AGA	12	9854	0.98	O	NEGATIVE
140	2.7	2	7	9	9	SGA	10	8975	1.2	AB	POSITIVE
141	3	2	7	9	0	AGA	9	12540	1.68	O	POSITIVE
142	2	2	7	9	0	SGA	9.6	15872	2.5	B	POSITIVE
143	2.8	2	7	9	2	SGA	8.3	7584	2.35	B	POSITIVE
144	2.65	2	7	9	11	AGA	11	9854	0.82	B	POSITIVE
145	2.3	2	7	9	2	SGA	9	11012	1.8	A	POSITIVE
146	3.6	2	7	9	0	AGA	8.3	14525	2.3	A	POSITIVE
147	2.4	2	7	9	0	SGA	9	18753	3	AB	POSITIVE
148	2.9	2	7	9	11	SGA	8.9	9875	2.3	A	POSITIVE
149	2.7	2	7	9	0	SGA	9	6985	0.86	A	POSITIVE
150	2.4	2	7	9	8	AGA	11	7854	1.23	O	POSITIVE
151	2.3	2	7	9	0	SGA	10	8975	3.2	A	POSITIVE
152	2.6	2	7	9	2	AGA	10	12450	1.54	A	POSITIVE
153	2.6	2	7	9	0	SGA	10	11205	2.3	O	POSITIVE
154	2.3	2	7	9	0	AGA	12	11287	1.6	AB	POSITIVE
155	2.1	2	7	9	0	AGA	10	9858	2.5	B	POSITIVE
156	2.9	2	7	9	0	AGA	11	9875	2.1	O	POSITIVE
157	3.2	2	7	9	0	AGA	8	7896	1.25	O	POSITIVE
158	2.5	2	7	9	5	AGA	8.3	8975	0.8	AB	POSITIVE
159	2.4	2	7	9	8	AGA	9	6987	1.3	O	POSITIVE
160	2	2	7	9	0	SGA	9	11254	2.5	AB	POSITIVE
161	2.7	2	7	9	5	AGA	11	12452	3	AB	POSITIVE
162	2.7	2	7	9	2	AGA	11	9868	1.9	A	POSITIVE
163	2.7	2	7	9	6	SGA	10	12010	2.4	A	POSITIVE
164	2.8	2	7	9	0	SGA	9	14525	1.35	O	NEGATIVE
165	2.3	2	7	9	0	SGA	8.6	11000	2	B	POSITIVE
166	2.8	2	7	9	0	AGA	9	10354	1.5	O	POSITIVE
167	2.6	2	7	9	0	SGA	12.1	8697	1.45	O	POSITIVE
168	2.7	2	7	9	0	AGA	11	8965	2.3	B	POSITIVE
169	3	2	7	9	5	AGA	9	9987	3.5	O	POSITIVE
170	2.8	2	7	9	0	AGA	10	6986	1	B	POSITIVE
171	2.6	2	7	9	8	AGA	11	8748	1.5	B	POSITIVE
172	2.2	2	7	9	0	SGA	9.6	5897	3.2	B	POSITIVE
173	2.4	2	7	9	2	AGA	9	9969	3.2	AB	POSITIVE
174	2.9	2	7	9	0	AGA	9	6989	1.25	B	POSITIVE
175	2.5	2	7	9	0	SGA	9.5	12541	2.3	B	POSITIVE
176	2.5	2	7	9	0	SGA	9	4583	3.5	AB	POSITIVE
177	2.1	2	7	9	2	AGA	9.5	12012	3.1	A	POSITIVE
178	3.1	2	7	9	3	AGA	10	15748	2.3	B	POSITIVE
179	2.1	2	7	9	9	AGA	11	4587	2.4	B	POSITIVE
180	2.4	2	7	9	2	AGA	12	5896	2.2	B	POSITIVE
181	2.1	2	7	9	2	AGA	9.2	11245	1.35	A	POSITIVE
182	2.2	2	7	9	2	SGA	8	4586	0.98	B	POSITIVE
183	2.3	2	7	9	3	SGA	8.2	8962	1.2	AB	POSITIVE
184	2.1	2	7	9	2	SGA	12.1	9857	2.6	B	POSITIVE
185	3.6	2	7	9	6	LGA	11	5687	2.3	B	NEGATIVE
186	3.2	2	7	9	5	AGA	9	5489	2.2	O	POSITIVE
187	3	2	7	9	8	AGA	8	9825	1.65	B	POSITIVE
188	2.8	2	7	9	3	SGA	11	10035	2.8	O	POSITIVE
189	2.8	2	7	9	2	SGA	9.6	12351	1.47	AB	POSITIVE
190	2.3	2	7	9	2	AGA	9	11758	1.89	O	POSITIVE
191	2.5	2	7	9	2	SGA	9	12012	2.3	AB	POSITIVE
192	2.8	2	7	9	5	AGA	8	9998	2.5	B	POSITIVE
193	3.1	2	7	9	2	AGA	9	9876	3	B	POSITIVE
194	3.2	2	7	9	5	AGA	9.5	9868	1.5	O	POSITIVE
195	3.5	2	7	9	6	AGA	10	11245	0.98	A	POSITIVE
196	2.5	2	7	9	0	SGA	11	11000	2.3	A	POSITIVE
197	2.4	2	7	9	0	AGA	12	9254	2	B	POSITIVE
198	2.4	2	7	9	2	AGA	8	7562	2.8	AB	POSITIVE
199	2.9	2	7	9	1	SGA	11.2	5886	2.5	A	POSITIVE
200	2.5	2	7	9	0	AGA	10	9542	1.86	B	POSITIVE

BLDE (DEEMED TO BE UNIVERSITY)
[Declared as Deemed-to-be-University u/s 3 of UGC Act, 1956 vide Government of India Notification No.F.9-37/2007-U.3(A)]
The Constituent College
SHRI. B. M. PATIL MEDICAL COLLEGE, HOSPITAL & RESEARCH CENTRE, VIJAYAPURA

BLDE (DU)/IEC/339/2018-19 21-12-2018

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The ethical Committee of this University met on21st December 2018 at 11 a.m.to scrutinizes the Synopsis/ Research Projects of Post Graduate Student / Under Graduate Student Faculty members of this University / College from ethical clearance point of view. After scrutiny, the following original/ corrected and revised version Synopsys of the thesis/ research projects has been accorded ethical clearance.

Title. A prospective study of cerebroplacental ratio: a marker of impaired fetal growth velocity and adverse pregnancy outcome.

Name of the Faculty member /PhD/PG/UG student. DR SOUMYA S PATIL (P. G)

Name of the Guide; DR.GIRIJA HANJAGI. ASSOCIATE PROFESSOR ,DEPT. OF OBG

Dr. Sharada Metgud
Chair person
IEC, BLDE (DU),
VIJAYAPURA

Dr.G.V.Kulkarni
Member Secretary
IEC, BLDE (DU),
VIJAYAPURA

MEMBER SECRETARY
Institutional Ethics Committee
BLDE (Deemed to be University)
Vijayapura-586103. Karnataka

Note:-Kindly send Quarterly progress report to the Member Secretary

Following documents were placed before ethical committee for Scrutinization.

- Copy of Synopsis/Research Projects
- Copy of inform consent form
  Any other relevant documents

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