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To find the association between cerebroplacental ratio and APGAR scores and birth weight in pregnancy

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Abstract
Background and Method: This study conducted in the department of Obstetrics and Gynecology at Sri Ramakrishna Hospital, which is a tertiary care hospital in Coimbatore, Tamil Nadu for 6 months, from November 2018 to April 2019 with an aim to find the association between Cerebroplacental ratio and APGAR Scores and birth weight in pregnancy. The study was conducted on women between ages of 18 and 45 years with low risk pregnancies who present for obstetrical ultrasound at 36 weeks of gestation or later over a period of 6 months. 60 women were chosen using convenience sampling strategy based on the above mentioned inclusion and exclusion criteria. Those who consented were included in the study.
Result: The mean age of subjects in this study was 27.28 ± 04.47 years with a range from 19 years to 37 years. Maximum no. 27 (45%) of the subjects belonged to the age group of 26-30 years and minimum no. 3 (5%) of the subjects belonged to the age group of 36-40 years age group. In our study, 28 (46.67%) of the subjects had normal cerebroplacental ratio as compared to 32 (53.33%) of study subjects with abnormal cerebroplacental ratio. It was found that 16 (26.67%) of study subjects gave birth to low birth weight baby, while 44 (73.33%) had normal birth weight baby. It was found that 16 (26.67%) of study subjects gave birth to low birth weight baby, while 44 (73.33%) had normal birth weight baby.
Conclusion: In the present study, no association was found between birth weight and cerebroplacental ratio. No association was found between cerebroplacental ratio and APGAR score at 1 minute. This study being a descriptive observational study has its own limitations pertaining to the nature of the study.

Keywords: Cerebroplacental ratio, APGAR scores, weight and pregnancy

Introduction
Ante partum fetal surveillance is the cornerstone of preventive obstetrics management aimed at minimizing maternal and perinatal mortality and morbidity. Ante partum detection of fetus at risk of death or compromise in utero remains the major challenges in modern obstetrics [1]. The principle aim of fetal monitoring during pregnancy and intrapartum is to assess fetal growth and wellbeing, to ensure a safe delivery and normal outcome for the mother and the fetus. Extensive research over the last decades has provided an increasing body of knowledge as well as advanced technology to enable monitoring of mothers and fetuses throughout pregnancy as well as in labor [2]. Fetal monitoring is aimed at identification of fetuses at risk of hypoxia-asphyxia, with the assumption that an early recognition of fetal compromise may enable timely intervention and prevent morbidity and mortality.
Specific and accurate methods for detection of fetus at risk can result in early appropriate intervention and hence reduce fetal loss. Antenatal test of fetal well-being depends indirectly on changes in fetal physiology, an aspect of fetus, which until recently, has been relatively inaccessible to study by the paucity of techniques to measure the placental function - the critical organ through which the transfer of nutrients occur [3]. New technologies have now become available in the clinical assessment of placental function. There are different methods of assessment during pregnancy and labor. Doppler ultrasound is one of the tests widely used in clinical practice in evaluation of pregnancies.
Diagnostic ultrasound is the main stay in the evaluation and management of obstetric patients. Fetal growth and development rely on normal uteroplacental and fetoplacental circulation to supply oxygen and nutrients from the maternal circulation. Doppler sonography offers a unique tool for the non-invasive evaluation of physiological hemodynamic fetoplacental blood flow information [4]. There are specific abnormalities in Doppler parameters in asymmetric intrauterine growth retardation.

Doppler sonography has become a part of routine antenatal surveillance in obstetrics during the past decade. Doppler measurement of the pulsatile blood velocity in umbilical artery gives direct information on fetoplacental circulation and hence identifies placental circulatory failure [5]. Blood flow measurement has significant impact in the detection of placental and fetal dysfunction since hemodynamic changes in the uteroplacental and fetal vessels can be demonstrated well before the clinical manifestation of obstetric complications.

Ultrasound Doppler studies are used during pregnancy to help manage pregnancies complicated by fetal growth restriction. It enables evaluation of sequential changes in circulatory hemodynamic in the fetus by evaluation of fetus for signs of brain sparing and severity of redistribution of circulation [6]. Recognition of abnormal Doppler flow patterns helps the clinician to optimize the appropriate timing of delivery.

Material and Method

This is a descriptive cross sectional pilot study conducted in the department of Obstetrics and Gynecology at Sri Ramakrishna Hospital, which is a tertiary care hospital in Coimbatore, Tamil Nadu for 6 months, from November 2018 to April 2019. The study was conducted on women between ages of 18 and 45 years with low risk pregnancies who present for obstetrical ultrasound at 36 weeks of gestation or later over a period of 6 months. 60 women were chosen using convenience sampling strategy based on the above mentioned inclusion and exclusion criteria. Those who consented were included in the study.

Data was collected using a semi structured questionnaire. Prior to data collection patient was informed about the purpose of the study and was briefed about the kind of questions they would be asked. A good rapport was developed with the patient so as to let her overcome her inhibitions and discuss freely.

Name, age, registration number and address of the patients were noted. Detailed obstetric history including the history of present and past pregnancy was obtained. Details of present pregnancy were asked, including the date of last menstrual period and patient was clinically examined.

A note was made of maternal weight, blood pressure and obstetrics examination findings and various laboratory investigation results. The ultrasound and Doppler was done and findings noted. Doppler studies were done on umbilical artery, middle cerebral artery and ductus venosus with real time color Doppler ultra sound machine. Cerebroplacental ratio of less than 1.07 was taken as abnormal. Mode of delivery was planned depending on the weight, gestational age and amount of liquor present. Outcome of pregnancy was recorded in detail including birth weight, apgar score. Adverse perinatal outcome leading to neonatal admissions were also noted. These details were entered in a proforma and the data statistically analyzed and evaluated.

Inclusion criteria

Women between ages of 18 and 45 years with low risk pregnancies who present for obstetrical ultrasound at 36 weeks of gestation or later.

Exclusion criteria

1. Multiple pregnancy at the time of presentation
2. Known foetal chromosomal anomaly
3. Known foetal malformation
4. Preeclampsia
5. Prior caesarean section
6. Placental abnormalities like placenta previa or accrete
7. Gestational diabetes

Results

Table 1: Distribution of the study subjects according to the different age groups

Age in years	Number of females	Percentage
<21	4	6.67
21-25	15	25.00
26-30	27	45.00
31-35	11	18.33
36-40	3	5.00
Total	60	100.00

The mean age of subjects in this study was 27.28 ± 04.47 years with a range from 19 years to 37 years. Maximum no. 27 (45%) of the subjects belonged to the age group of 26-30 years and minimum no. 3 (5%) of the subjects belonged to the age group of 36-40 years age group.

Table 2: Distribution of study subjects according to the values of cerebroplacental ratio

CPR value	No. of subjects	Percentage
>1.08 (Normal)	28	46.67
<1.08 (Abnormal)	32	53.33
Total	60	100.00

In our study, 28 (46.67%) of the subjects had normal cerebroplacental ratio as compared to 32 (53.33%) of study subjects with abnormal cerebroplacental ratio.

Table 3: Distribution of the infants according to their birth weight

Birth weight	No. of infants	Percentage
Normal ≥ 2500 GM	44	73.33
Low birth weight ≤ 1500 - 2499 GM	16	26.67
Very low birth weight ≤ 1500 GM	00	00.00
Total	60	100

It was found that 16 (26.67%) of study subjects gave birth to low birth weight baby, while 44 (73.33%) had normal birth weight baby.

Discussion

It was found that the mean age of study subjects was 27.28 ± 0.577 years. The range of age was from 19 years to 37 years. Majority of the study subject belong to age group of 26 to 30 year followed by those belonging to 21 to 25 years, 31 to 35 years, less than 21 years and more than 36 years. The percentage of this was 45%, 25%, 18.33%, 6.67% and 5% respectively. This was similar to Khalil *et al.* [7], where the mean age of study subject was 31 years.

Majority of study subjects had a marital life of between 1 to 3 years (41.67%) during the current pregnancy. It was followed by duration of more than 5 years (25%). For this study the duration for marital life was equal for those who were married for less than 1 year and between 3 to 5 years (16.67%). The range for the marital life duration was 9 months to 13 years.

In the pilot study 33 study subjects (55%) were primipara while 27 of the study subjects (45%) were multipara. Which was similar to Khalil *et al.* [7] where 55.6% of study subjects were primipara.

Association between cerebroplacental ratio and birth weight was not found to be significant at 0.05 when chi square test was applied. The association of birth weight, SGA and FGR with CPR was reported by some studies [8-10]. Lower median and mean birth weights was associated with low a CPR in some

studies [9, 11] though one study reported no difference in mean birth weights across CPR centiles [12]. The latter study along with others did however report a significant correlation between CPR and birth weight centiles, with higher birth weight centiles reported in the normal CPR cohort [12]. Even amongst AGA cohorts, those with lower birth weights had a significantly lower CPR [9].

When chi square test was applied between APGAR score at 1 minute after birth and cerebroplacental ratio, it was found to be not significant.

There were few studies [10, 12] that reported the relationship between the CPR and Apgar scores. Prior *et al*., 2015 [13], reported that Apgar scores <7 at both 1 min (56.5% v 5.1% $p<0.001$) and 5 min (27.5% v 1.3%, $p<0.001$) were significantly lower with a low pre-labor CPR. Another study reported a greater frequency of poor Apgar scores in the low CPR group, but these did not reach significance. In a further study no poor Apgar scores were observed irrespective of the CPR.

Conclusion

In the present study, no association was found between birth weight and cerebroplacental ratio. No association was found between cerebroplacental ratio and APGAR score at 1 minute. This study being a descriptive observational study has its own limitations pertaining to the nature of the study.

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