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Doppler role in cerebral and umbilical blood flow velocity during pregnancy

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Abstract
Reduction of moderate cerebral artery indices in IUGR pregnancy. Of pregnancy with IUGR, the mean amniotic fluid level is substantially reduced. A prospective study was conducted at the KIMS for routine prenatal screening with 50 females with natural singleton pregnancy and 50 females with intrauterine development are pregnant. Study duration was from Oct. 2011 to May 2013. The study aims to evaluate the velocity of the blood flow of the brain and umbilical artery in normal and growth-restricted pregnancy. IUGR pregnancy significantly increases the umbilical artery index. The umbilical cerebro ratio in the research group is substantially decreased, indicating the possibility of brain sparing impact.

Keywords: pregnancy, artery, doppler, cerebral, umbilical, blood flow, IUGR, new born

Introduction
The expected fetal weight estimated for gestational age, can outcomes in substantial fetal morbidity and mortality if not properly treated. Restriction of fetal development is the second leading cause of perinatal morbidity and premature-led mortality [1]. In the general obstetric population, the occurrence of intrauterine growth restriction (IUGR) is estimated at about 5 per cent [2]. The mortality rate in children weighing less than 1500 g is 70 to 100 times higher (3 lb, 5 oz) [3].

Wladimiroff *et al* conducted a study to determine the flow of cortical and umbilical blood velocity wave-forms in regular and growth-restricted pregnancies. In 156 normal pregnancies and 42 intrauterine growth retardation cases (birth weight below the 10th percentile) a pulsation index for the fetal internal carotid artery and umbilical artery was analyzed utilizing a combination sector and pulsed Doppler method. Each birth was in the third trimester. In normal pregnancies, the pulsatility index for the umbilical artery and the umbilical artery / internal carotid artery ratio decreased generational due to age [4]. However, till date very few studies has been undertaken which had Compared blood flow velocities head to head in normal and growth restricted pregnancy. Hence this study has been planned in order to evaluate cerebral and umbilical arterial blood flow velocity in department of general and development restrictions in pregnancy of Obs & Gyn at Krishna Institute of Medical Sciences, Karad.

Aim and Objectives
To evaluate middle cerebral artery and umbilical velocity waveforms and their various indices during the third trimester of pregnancy. Calculating the percentage of middle cerebral artery and umbilical artery pulsatility factor. To study birth weight, apgar score and delivery style and perinatal outcome in the context of intensive neonatal care unit.

Review of Literature
Intrauterine growth restriction (IUGR) is characterized as a fetus growth rate that is lower than average for a fetus' growth capacity (especially for gestational age); [5]. IUGR-affected fetal small for gestational age (SGA) constitute a subset of cases of infants [6]. In SGA, the fetus' median weight for its gestational age is below the 10th percentile, and the abdominal circumference (AC) is less than 2.5 percent [7]. In correctly dated pregnancies, about 80-85 percent of the fetuses reported as IUGR are legally tiny but healthy, 10-15 percent are 'real' cases of IUGR, and the remainder 5-10 percent are impacted by chromosomal/structural anomalies or recurrent intrauterine infections [8]. IUGR will cause 10 to 15 percent of all physiological deliveries complicated [9]. It should be remembered, however, that the occurrence of these cases differs depending on the community, the geographical area being investigated and the normal growth curves used as guide [7].

Khurana *et al* [10]. calculated the S/D level is 3.07 at 7 months and 2.64 at 9 months. Degani *et al* studied 53 pregnancies suspected for a small-for-gestational age foetus (SGA) by ultra-sonographic weight estimation using pulsed Doppler (Duplex) for recording foetal blood flow velocity wave-forms from the umbilical artery and fetal internal carotid artery. The gestational age ranged from 29 to 40 weeks. In 42 cases an SGA newborn was delivered, 34 newborns were SGA. Foetal structural and/or chromosomal defects were found in four cases, all of which showed symmetric intrauterine growth restriction and normal PI values in the foetal internal carotid artery. The ratio amongst the umbilical artery PI and the internal carotid artery was found to be the greatest predictor of SGA (sensitivity 84.2 per cent, accuracy 90.9 per cent, optimistic predictive value 97.0 percent, negative predictive value 62.5 per cent). Using the more demanding criteria for SGA according to Usher and McLean, sensitivity improved to

100%, specificity was 80.0%, positive predictive value 87.9%, and negative predictive value 100% [11]. Arduini *et al* studied 78 high-risk pregnancies in order to define the clinical value of the analysis of foetal blood flow velocity wave-forms in early screening for growth restriction. The pulsatility factor was assessed at the point of the umbilical artery, the aorta descending and the carotid internal artery [12].

Methology and Methods

This study was performed for routine prenatal screening with 50 women with usual singleton pregnancy and 50 women with minimal intrauterine growth restricted pregnancies at the Krishna Institute of Medical Sciences between 28 and 40 weeks of gestation.

Duration of the study was from October 2011 to May 2013 on patients that have been fit to the inclusion criterion and a pre-structural proforma to achieve.

Observation and Results

Table 1: Comparison of cerebro umbilical ratio between the two groups

Variable	Mean ± sd		P value
	Study group	Control group	
Cerebro umbilical Ratio (C/U	1.47 ± 0.45	1.77 ± 0.43	0.0012

As seen in Table No. 1, unpaired t test is implemented. If < 0.05, the value P is significant.

Table 2: Comparison between the two groups with the end diastolic volume

Absent end diastolic volume (AEDV)	N (%)		Grand Total	P value
	Study group	Control group		
Present	6	0	6	0.0267
	12.00%	-	6.00%	
Not present	44	50	94	
	88.00%	100.00%	94.00%	
Grand Total	50	50	100	

The exact test is implemented, as seen in table no. 2. If < 0.05, the value P is significant.

Table 3: Term/Preliminary comparison between the two classes

Variable	N (%)		Grand Total	P value
	Study group	Control group		
Term Delivery	32	50	82	< 0.0001
	64.00%	100%	82.00%	
Preterm Delivery	18	0	18	
	36.00%	-	18.00%	
Grand Total	50	50	100	

The exact fishing test is applied, as seen in table no. 3. If < 0.05, the value P is significant. If < 0.05, the value P is significant.

Discussion

In our study, age of the patients is comparable in between study (24 years) and control group (23 years) (p > 0.05). Similarly, gestational ages is comparable in between study (32 weeks) and control group (33 weeks) (p > 0.05). This indicates equal distribution of patients in study and control groups in terms of age and gestational age. Wladimiroff *et al* found gestational age based decrease in the umbilical artery pulsatility level of in normal pregnancies. In growth-restricted pregnancies umbilical artery had raised pulsatility index [4]. Wladimiroff *et al*, in normal pregnancy pulsatility index of ICA was reduced from 1.63 at 26-27 wk of gestation to 1.31 at 38-39 wk. In IUGR, the pulsatility index of ICA pulsatility index was reduced in 45% [13]. In a study by Degani *et al* in 53 pregnancies suspected for a small-for-gestational age fetus (SGA), in 42 cases an SGA newborn was delivered. Fetal structural and/or chromosomal defects were found in four cases, all of which showed symmetric IUGR and normal PI values in the fetal internal carotid artery.

Summary and Conclusion

Throughout this study, the cerebro umbilical ratio is significantly reduced which indicates the existence of brain sparing influence. IUGR pregnancies arrive sooner delivery as opposed to usual pregnancies. LSCS delivered significant numbers of infants having IUGR. The average birth weight for study group is decreases substantially reduced in regulation. Similarly, substantial numbers of infants in IUGR pregnancies need admission to NICU. PIH has been associated to a significant number of patients in the research sample.

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