

# A Comparison of Fetal Outcome in Pregnant Women with Fetal Growth Restriction in Normal & Abnormal Umbilical Artery Doppler

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## ABSTRACT

**Aim:** To compare fetal outcome in pregnant women with intrauterine growth restriction (IUGR) in normal and abnormal umbilical artery Doppler (UAD) studies.

**Study design:** Cross sectional comparative study.

**Setting:** Obstetrics & Gynaecology, Moula Bakhsh Teaching Hospital affiliated with Sargodha Medical College Sargodha from January 2012 to June 2013.

**Method:** Patients with fetal growth restriction between 28-37 weeks of gestation selected and followed with UAD study along with other Biophysical tool. Patients divided into two groups with normal and abnormal UAD waveform. Fetal outcome compared in two groups.

**Results:** The growth restricted fetuses with abnormal UAD studies have low APGAR score, babies with normal UAD studies (90%) had APGAR score > 7 at 5 minutes after birth. Babies with raised Resistance Index (80%) and absent end diastolic flow (27%) and Reverse end diastolic flow (7%) had APGAR score > 7 at 5 minutes after birth.

**Conclusion:** Growth restricted fetuses with normal UAD are at lower risk than those with abnormal UAD studies in terms of poor APGAR score.

**Keywords:** Fetal growth restriction, umbilical artery doppler studies, fetal outcome.

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## INTRODUCTION

Small fetuses contribute a large heterogeneous group that includes healthy small fetuses, chromosomally abnormal fetuses and fetuses suffering from uteroplacental insufficiency leading to restriction in fetal growth<sup>1</sup>. Intrauterine growth restricted fetuses have low growth potential as a result of genetic disease or environmental damage or due to reduced placental perfusion and interplacental insufficiency. They are at increased risk of perinatal morbidity and mortality which require close fetomaternal monitoring and probably early intervention. When a diagnosis of small fetuses is based on biometric measurement the umbilical artery should be used in primary surveillance test<sup>2</sup>. Randomized trials have shown that management based on results of umbilical artery Doppler(UAD) study significantly improve a number of important obstetrical outcome including antenatal admission, elective delivery and induction of labour<sup>3</sup>. It is important to measure the uterine artery resistance using pulsatility index (PI) and resistance index (RI). A raised index indicates an abnormality together with absent end diastolic flow (AEDF) and reversed end diastolic flow (REDF) reflects underlying vascular pathology. AEDF and REDF correlate with more occlusive lesion in placenta high perinatal mortality<sup>4,5</sup>.

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## MATERIALS AND METHODS

The study was conducted in obstetrics & gynaecology department of Moula Bukhsh teaching Hospital affiliated with Sargodha Medical College Sargodha from Jan'12 to June'13. Total 100 cases of fetal growth restriction (FGR) were selected & divided into two groups. Group 1 having 50 pregnant women with FGR and normal umbilical artery Doppler and group 2 with 50 pregnant women with FGR and abnormal UAD finding. It was cross sectional & comparative study, sampling was non probability. Pregnant women between 18-38 years, more than 28 wks of gestation with fetal growth restriction were included in the study. Pregnant women with multiple gestation, with unsure of Last Menstrual Periods (LMP) and with Fetal growth restriction associated with congenital anomalies were excluded in this study.

All women with single pregnancy and small for gestational age fetuses were selected on basis of above mentioned criteria. The FGR suspected clinically & confirmed by ultrasound. FGR has defined as fetal abdominal circumference (AC) below 10<sup>th</sup> centile. The fetal biometry included biparietal diameter (BPD), head circumference (HC), AC, femur length. Fetal weight estimated using HadLock formula using FL, AC, BPD, Amniotic fluid index (AFI) were noted. Oligohydraminos was considered when AFI was 8 or less without rupture of membranes. All patients included in the study had UAD study & divided into two, Group1 (n=50) included women FGR & normal UAD flow. Group 2 (n=50) included

women with FGR abnormal UAD study absent or reverse end diastolic flow in umbilical artery. Some patients may be shifted from group1 to group2. Steroid given to enhance lung maturity between 28-36 wks. UAD study done weekly or biweekly according to condition. Fetal biometry for growth done fortnightly. Fetal monitoring done including examination of fetal movement, cardiotocography (CTG), Biophysical profile (BPP), AFI. The decision for delivery was based on gestational age, abnormal UAD study and severe growth restriction with AFI less than 5, poor CTG or BPP. The induction of labour, emergency or elective c- section was done for obstetrical indication. Statistical analysis was done.

**RESULTS**

Total 100 pts were studied, mean age & parity among two groups was comparable. Abnormal Doppler studies seen in patients with past history of SGA or PIH. The association of maternal characteristics with normal and abnormal Doppler studies is shown in table II. Patients with abnormal Doppler were more likely to have C- section. Emergency C- section was done more in group II with abnormal Doppler 28.2% & 66% as compared to normal Doppler studies. High incidence of perinatal asphyxia (16%) in term of low apgar score is seen in patients with abnormal Doppler studies that was noted at 1 & 5 min after birth. The results are shown in table (IV & V).

Table I: Demographic & antenatal features

Obstetric history	Group I	Group 2
Maternal age	27.4yr	28.8yr
PG	18(3.6%)	20(40%)
Multiparous	30(60%)	33(66%)
Past history SGA	3(6%)	5(10%)
Past history PIH	2(4%)	5(10%)
Past history IUD	4(8%)	5(10%)

Table II: Comparison of antenatal characteristics

Antenatal Characteristics	Group1	Group 2	
		Raised(RI) (n=35)	AEDF/REDF (n=15)
PIH	15(30)	15(42%)	1(66.6%)
Gestational diabetes	1(2%)	1(1.8%)	-
Oligohydraminos	10(20%)	13(37%)	4(26%)
Idiopathic	24(48%)	6(17%)	1(6.6%)

Table III: Mode of delivery

Antenatal Characteristics	Group I	Group 2	
		Raised(RI)	AEDF/REDF
SVD	9(18%)	2(5.7%)	-
Vaginal after IOL	17(34%)	5(14.2%)	1(6.6%)
Em C-Section	8(16%)	10(28.2%)	10(66%)
Elective C-Section	16(32%)	18(51%)	4(26%)

Table IV: Apgar score at one min

UA Doppler Finding	<3	4-7	>7	Total
Normal	0	9(18%)	41(80%)	50
Raised RI	5(14%)	11(31%)	19(55%)	35
AEDF	2(13%)	7(46%)	2(13%)	15
REDF	2(13%)	2(13%)	0	

Table V: Apgar score at 5 min

Uterine Artery Doppler	<3	4-7	>7	Total
Normal	0	5(10%)	45(90%)	50
Raised RI	0	7(20%)	28(80%)	35
AEDF	0	7(46%)	4(27%)	15
REDF	0	3(20%)	1(7%)	

**DISCUSSION**

Fetal growth restriction (FGR) contributes not only neonatal morbidity and mortality but also to major psychiatric sequelae as depression and suicide. Fetal growth restriction affects 5-10% of pregnancies<sup>6</sup>. CTG and Biophysical profile (BPP) are conventional monitoring tool. Doppler velocimetry of umbilical & fetal circulation has become established method of antenatal monitoring & allow non invasive assessment of fetal circulation<sup>7</sup>. Relationship between Doppler finding & perinatal risk is defined in many studies<sup>8</sup>. Adaptive changes in fetal circulation in presence of fetal hypoxia can be detected by Doppler ultrasound. In pregnancy complicated by FGR impedance to flow in umbilical artery is increased<sup>9</sup>. Our study was based on intensity of monitoring & on results of Doppler study. Ominous sign include uterine artery absent or reverse end diastolic flow, now assuring NST, poor BPP. Abnormal Doppler precedes decreased growth velocimetry in fetal growth chart. A study done in Aga Khan Hospital Karachi confirmed that Doppler ultrasound is accurate method for diagnosis & management of FGR<sup>10,11</sup>. In our study there was direct & linear relationship between poor apgar or absent UA Doppler study.

Various studies reported that oligohydraminos & gestational diabetes are poor prediction of perinatal outcome in FGR<sup>12</sup>. Same is seen in our study. Umbilical artery Doppler study is not good predictor of adverse perinatal outcome in diabetic pregnancy. In our study there were 2 diabetic patients. Gonzalez's study<sup>13</sup> compared efficiency of CTG, BPP & abnormal umbilical artery Doppler in predicting adverse pregnancy outcome. The study proved that abnormal uterine artery study associated with increased risk. This is in agreement with our study.

The mothers of growth restricted baby with abnormal uterine artery were frequently delivered by Caesarean section, so that the patient should be

counseled for caesarean section the results are shown in Table III. In our study no baby was delivered vaginally with AEDF.

Various workers reported that perinatal morbidity and mortality was significantly greater in growth restricted babies with abnormal uterine artery Doppler study especially the reverse flow is associated with high perinatal mortality<sup>14,15</sup>. Similar results were seen in our study that 7 out of 11 babies with REDF having APGAR score of <7 at 5 minutes. In large study 145 growth restricted babies from Italy, Cosmi & Co workers reported that neonatal death was increased in fetuses with umbilical artery reverse flow<sup>16</sup> doppler studies.

Doppler studies help in decision making with aim to reduce iatrogenic complication of prematurity and at the same time minimizing the long term consequences of hostile in utero environment<sup>17,18</sup>. With this surveillance tool, timing of delivery become less controversial.

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