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Pathology

A PROSPECTIVE OBSERVATIONAL STUDY COMPARING CLINICAL OUTCOME OF IUGR NEONATES WITH NORMAL AND ABNORMAL UMBILICAL ARTERY FLOW DOPPLER

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ABSTRACT **Background:** Intrauterine growth restriction (IUGR) is one of the causes of perinatal mortality and morbidity which affects approximately 9.65% of pregnancies worldwide. Doppler indices from the fetal circulation can reliably predict adverse perinatal outcome. **Aims &objectives:** To compare perinatal complications and outcome between term and preterm IUGR neonates having normal and abnormal umbilical artery flow Doppler. **Methodology:** 140 IUGR Neonates with abnormal and normal antenatal umbilical artery Doppler scan admitted in NICU of Civil Hospital, Ahmedabad were included in the study. Amongst them 52 were preterm and 88 were term neonates. Study was conducted between October 2019 to December 2019. Primary outcome measure is neonatal mortality and secondary outcome measure is neonatal morbidities like perinatal asphyxia, hypoglycemia, NEC, hyperbilirubinemia etc. **Results:** Amongst140 IUGR neonates Preterm were more in case group 36(51.4%) compared to control group 16(22.8 %.) Hypoglycaemia and NEC was observed more in preterm 19 (36.5%) and 14(26.9%) compared to 16(18.2%) and 11(12.5%) in term respectively. Birth asphyxia was observed more in term 26(29.5%) than preterm 7(13.5%). At birth perinatal asphyxia was observed more in case group, 27 out of 70 (38.5%), as compared to 6 out of 70 (8.5%) in control group (P <0.05). Hypoglycemia and NEC was noticed in 30(42.8%) and 24(34.2%) neonates in case group, as compared to 5(7.1%) and 2(2.8%) neonates in control group respectively. (P < 0.05) **Conclusion:** Neonates with abnormal Umbilical Artery Doppler flow are at increased risk of perinatal complications and needs extra care during this period.

KEYWORDS : Antenatal Doppler flow, IUGR, Neonatal outcome

INTRODUCTION
Intrauterine growth restriction is defined as birthweight less than 10th percentile for gestation age.In IUGR neonates fetal growth is less than the normal growth potential of a particular neonate due to environmental or genetic factors [1]. IUGR is one of the most important causes of perinatal morbidity and mortality, affecting around 9.65% of pregnancies worldwide [2]. Nearly 75% of all IUGR neonates are found to be concentrated mainly in Asia, which accounts for the highest burden of IUGR neonates all around the World. . When fetal growth standards are compared many of preterm neonates are also IUGR [3].

In the feto-placental-maternal unit any disturbance, disorder or disease of functional and/ or anatomical origin makes the fetus unable to achieve his/ her intrinsic growth potential. Failure to gain this growth potential is known as intrauterine growth restriction (IUGR) [4]. Complications which occur at the time of birth or in neonatal period are more likely to stay with that child even in later life. IUGR neonates are at higher risk of suffering from Perinatal Asphyxia, Cold stress, Hypoglycemia, Hyperbilirubinemia, feed intolerance, NEC, Sepsis and even mortality. So it is very important to identify and manage these babies appropriately at birth [5, 6]. Umbilical artery flow Doppler is proved to be an important sensitive and specific noninvasive tool in high risk pregnancies for predicting IUGR and thus preventing perinatal morbidities and mortality [6].

MATERIALS AND METHODS:
The present study is a prospective observational study carried out in the NICU of Civil Hospital Ahmedabad. Total 140 IUGR neonates were included in this study. It was conducted between October 2019 to December 2019. Term and preterm IUGR neonates having abnormal and normal antenatal umbilical artery Doppler scan admitted during study period were included in our study.

Presentation at the time of data collection like absent end diastolic flow, reversed end diastolic flow and high resistance flow in umbilical artery on antenatal Doppler was considered abnormal. Neonatal mortality was considered as primary outcome while other neonatal morbidities like NEC, Polycythemia, Hypoglycemia, Hyperbilirubinemia, Perinatal asphyxia, Sepsis etc were considered as secondary outcomes in our study. IUGR without antenatal umbilical artery Doppler scan, with major anomalies and whose relatives denied for consent were excluded from the study group. Gestational age of neonates was assessed using modified Ballard score and weight was recorded within 24 hour of birth using electronic weighing scale. These neonates were treated according to aiims protocols and were followed up till discharge and morbidities and mortalities were noted.

STATISTICAL ANALYSIS:
Data analysis was done by using SPSS software. Statistical associations were compared between both the groups i.e normal and abnormal antenatal Doppler scan by using chi-square test. P value less than 0.05 was considered as statistically significant.

RESULTS:
Total 140 infants were included in our study with 70 in cases and control group. IUGR infants with abnormal Doppler scan were taken as cases, while those with normal Doppler scan taken as controls. Outcome between cases and controls was compared. Socio-demographic characteristics of study participants are shown in table 1.

Table 1: Socio-demographic characteristics of mothers enrolled into our study at Asarwa civil, Ahmedabad. (N=140)

Variable	Category	Normal UA Doppler (n=70) (%)	Abnormal UA Doppler (n=70) (%)	X^2 (p value)
Maternal Age	<20	2 (2.85)	2 (2.85)	2.209 (0.697)
	20-25	39 (55.71)	31 (44.29)	
	26-30	22 (31.43)	26 (37.14)	
	31-35	4 (5.71)	7 (10.00)	
	>35	3 (4.29)	4 (5.71)	

Religion	Hindu	41 (58.57)	39 (55.71)	0.117
	Muslim	29 (41.43)	31 (44.29)	(0.732)
Education	Illiterate	22 (31.43)	27 (38.57)	1.777
	Primary	22 (31.43)	20 (28.57)	(0.619)
	Secondary	17 (24.29)	18 (11.43)	
	Graduate/ Post G	9 (12.86)	5 (7.14)	
Occupation	Housewife	32 (45.71)	37 (52.86)	1.255
	Labourer	18 (25.71)	18 (25.71)	(0.868)
	Govt. employee	11 (15.71)	9 (12.86)	
	Private employee	8 (11.43)	5 (7.14)	
	Student	1 (1.43)	1 (1.43)	
Residence	Rural	27 (38.57)	32 (45.71)	0.732
	Urban	43 (61.43)	38 (54.29)	(0.392)
Preterm	28-32	1 (1.43)	4 (5.71)	12.95
	32-34	4 (5.71)	12 (17.14)	(0.004)
	34-37	11 (15.71)	20 (28.57)	
Term	>37	54 (77.14)	34 (48.57)	

There is no statistically significant associations were found between these socio-demographic characteristics and Doppler scan. Proportion of preterm delivery in case group (36, 51.5%) was significantly higher as compared to control group (16, 22.8%, p = 0.004).

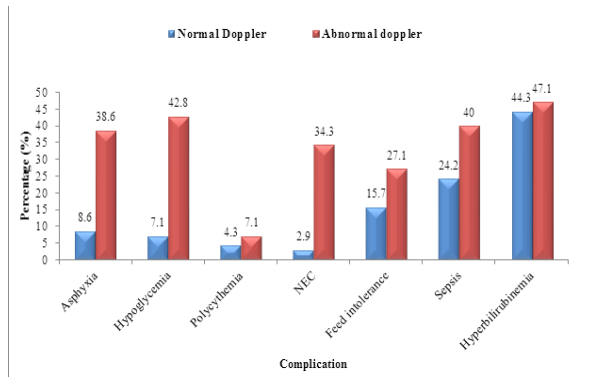**Figure 1: Neonatal Complications in Normal (n=70) Vs Abnormal Doppler scan (70)**

Figure 1 shows the comparison between perinatal complications of neonates with IUGR among having normal and abnormal antenatal umbilical artery Doppler scan. Our study results suggested that neonatal asphyxia is more prevalent among IUGR infants with abnormal Doppler scan. Incidence of asphyxia was more among cases, 27 (39%) out of 70 than controls, 6 (9%) out of 70 study participants. This observed difference was statistically significant with p-value <0.005. Similarly statistically significant result was observed in case of development of hypoglycemia as well as NEC among IUGR neonates with abnormal Doppler scan. Development of hypoglycemia was observed in 30 (43%) out of 70 neonates among cases, while it was only 5 (7%) out of 70 neonates among controls. Also development of NEC was observed more among cases 24 (34%) out of 70 than controls 2 (3%) out of 70.

Table 2: Comparison of Perinatal complications among term and preterm neonates having abnormal and normal umbilical Doppler

Complications	Pre term (n=52) (%)	Term (n=88) (%)	X2 (p value)
Asphyxia	7 (13.5)	26 (29.5)	4.69 (0.03)
Hypoglycaemia	19 (36.5)	16 (18.2)	5.87 (0.01)
Polycythemia	3 (5.8)	5 (5.7)	0.004 (0.98)
NEC	14 (26.9)	11 (12.5)	5.77 (0.01)
Feed intolerance	15 (28.8)	16 (18.2)	1.48 (0.22)
Sepsis	16 (30.8)	29 (33.0)	0.07 (0.78)
Hyperbilirubinemia	30 (57.7)	34 (38.6)	4.78 (0.02)

Perinatal outcome was compared in term and pre term neonates in table 3. Hypoglycemia, NEC, Hyperbilirubinemia was significantly higher in preterm babies as compared to term babies.

Table 5: perinatal complications in preterm and term having abnormal umbilical artery flow Doppler

Complications	Preterm (n=36) %	Term (n=16) %	P value
Asphyxia	13 (36.1)	14 (87.5)	< 0.001
Hypoglycaemia	24 (66.6)	06 (37.5)	0.19
Polycythemia	4 (11.1)	1 (6.2)	1.00
NEC	16 (44.4)	3 (18.7)	0.11
Feed intolerance	18 (50.8)	10 (37.5)	0.54
Sepsis	21 (58.3)	9 (56.2)	1.00
Hyperbillirubinemia	26 (72.2)	7 (43.7)	0.06

Perinatal among term and pre term neonates having abnormal and normal umbilical Doppler is shown in table 5. Asphyxia was significantly higher in term neonates.

DISCUSSION

Early recognition by Doppler scan can make us aware to take extra care from the beginning especially for IUGR neonates with abnormal Doppler scan. Total 140 IUGR preterm and term neonates {70 having normal (cases) and 70 abnormal (controls) umbilical artery flow Doppler scan} were enrolled and followed till the desired outcome. Amongst them 52 were preterms and 88 were fullterms.

In our study most common complication was sepsis (45 32.1%), followed by hypoglycemia (35, 25.0%), asphyxia (33, 23.5%) and feed intolerance (30, 21.4%). In the study conducted by Shivaprasad B et al.[7], most common morbidity was hypoglycemia (35%) followed by sepsis (26.6%). Deorari et al.[8] concluded that the most common morbidities were hypoglycemia (17%) and polycythemia (10%).

At birth perinatal asphyxia was observed more in case group (38.5%) compared to 8.5% in control group, statistically significant (P <0.05). Hypoglycemia and NEC was noticed in 42.8% and 27.14% neonates in case group respectively, compared to 7.1% and 2.8% neonates in control group respectively, which is statistically significant. Polycythemia, sepsis was noticed more in case group, but statistically not significant. Mortality was not observed in any group. Tolu LB et al. [9] showed 15 neonatal deaths in both the groups. 24% from those having abnormal Doppler scan and 4.5% from normal Doppler scan group. Similarly a study done by Shivaprasad B et al.[7], showed higher and significant result regarding these complications in IUGR having abnormal Doppler scan. Result for perinatal asphyxia in case group was 37%, for hypoglycaemia it was 63% and for sepsis it was 50%.

In our study, preterms were more in case group (51.4%) compared to control group (22.8 %) Hypoglycaemia and NEC was observed more in 36.5% and 26.9% preterms as compared to 18.2% and 12.5% in fullterm respectively. Birth asphyxia was observed more in term neonates (29.5%) as compared to preterms (13.5%). Birth asphyxia was more in term IUGR neonates and hypoglycemia, feed intolerance, NEC, hyperbiliruinemia in preterm IUGR having abnormal Doppler scan.

CONCLUSION

IUGR neonates with abnormal umbilical artery Doppler scan are at increased risk of having preterm delivery and most likely to suffer perinatal complications like asphyxia, hypoglycemia and NEC than IUGR neonates having normal umbilical artery Doppler scan. If this situation is detected early than most of these complications can be prevented or can be minimised by taking extra care during their hospital stay or at home.

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