ORIGINAL RESEARCH

Cross Sectional Study To Assess Perinatal Outcome Of Intrauterine Growth Restriction Babies Delivered In Jehangir Hospital, Pune, Maharashtra

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Received: 06 August, 2023 Accepted: 10 September, 2023

ABSTRACT
Background: Intrauterine growth restriction (IUGR) is a common diagnosis in obstetrics and carries an increased risk of perinatal mortality and morbidity. Identifying the factors responsible for the IUGR is crucial for early intervention to improve the perinatal outcome. **Aim:** The major objectives of this study are to analyze the impact of risk factors on IUGR and the perinatal outcome in our hospital**. Methods:** This cross-sectional study was done on 53 IUGR diagnosed cases, at Jehangir Hospital, Pune, Maharashtra, India. A detailed history especially regarding nutrition, habits (alcohol intake, smoking and tobacco chewing), socioeconomic status and adequate weight gain were elicited carefully. All patients were evaluated for risk factors under study. Perinatal outcomes were recorded for all pregnancies**. Results:** A total of 53 diagnosed cases of IUGR reported in our study. Majority of the cases were birth weight of 2.25 to 2.5 kg (41.5%), mean birth weight was 2.071 ± 0.371 kg. Neonatal outcome of IUGR babies was seen with respect to Cord pH >7.1 was (94.3%) and NICU admissions were 64.3%. Asymmetrical IUGR has worse perinatal and neonatal outcome as compared to symmetrical IUGR. **Conclusions:** Fetal growth restriction is the single most important contributor to perinatal and neonatal morbidity and mortality

Keywords: Intrauterine growth restriction (IUGR), perinatal outcome, neonatal outcomes, symmetrical IUGR, asymmetrical IUGR

INTRODUCTION

IUGR is defined as birth weight less than tenth percentile of average birth weight for the gestational age, IUGR is a clinical definition and applies to neonates born with clinical features of malnutrition and in-utero growth restriction, irrespective of their birth weight percentile. IUGR refers to a condition in which a fetus has failed to achieve its genetically determined growth potential [1-2]. IUGR is a common and complex obstetric problem. IUGR is noted to affect approximately 10-15 % of pregnant women [3]. Many preterm infants are also IUGR when growth is based on fetal growth standard. IUGR preterm infants are at increased risk for perinatal death and neonatal complications. Fetal growth restriction is the second leading cause of perinatal morbidity and mortality, followed only by prematurity [4-5]. In assessing perinatal outcome by weight, infants who weigh less than 2,500 g (5 lb, 8 oz) at term have a perinatal mortality rate that is five to 30 times greater than that of infants whose birth weights are at the 50th percentile. The mortality rate is 70 to 100 times higher in infants who weigh less than 1,500 g (3 lb, 5 oz). Perinatal asphyxia involving multiple organ systems is one of the most significant problems in growth-restricted infants [6-7]. The perinatal outcome of IUGR fetuses is largely dependent on the severity of growth restriction with those below the 3rd centile and/ or abnormal umbilical artery Doppler measurements at greatest risk of adverse outcome [8]. Despite this, SGA infants may have an increased risk of perinatal morbidity and mortality, especially if undiagnosed before birth, and adverse long-term outcomes such as cardiovascular disease or poor cognitive development in adulthood [9-10]. IUGR outcomes including Perinatal Asphyxia, Cold stress,

Hypoglycemia, Hypocalcaemia, Hyperbilirubinemia, Feed intolerance, NEC, Sepsis and even mortality. After recovery they remain more prone to poor physical growth, poor neurodevelopment outcome, recurrent infections and chronic diseases (hypertension, hyperlipidemia, coronary artery disease) later in life [11-12]. Diagnosis of IUGR prenatally, increased surveillance and timely delivery aims to improve perinatal outcome in IUGR, balancing the risk of antepartum stillbirth by remaining in utero and iatrogenic prematurity potentially causing significant morbidity or neonatal death by too early intervention [13].

AIMS & OBJECTIVES

The major aims and objectives of this study are to analyze the risk factors and perinatal outcome of IUGR in our hospital**.**

MATERIAL AND METHODS

This was a cross-sectional study was conducted in the department of obstratics and gynecology, at Jehangir Hospital, Pune, Maharashtra. Women diagnosed IUGR during the study period (September 2006 to August 2007)**,** were enrolled in present study.

Eligible participants were women over 18 years of age, singleton pregnancies with vertex presentation (28 to 40 wks) who have been diagnosed as IUGR and capable of giving informed consent were included

Women not eligible were multiple pregnancies, known; planned or impending delivery, major fetal structural abnormality or invasive prenatal testing showing fetal karyotype abnormality and who not giving consent for the study were excluded.

All delivery could be undertaken based on a maternal indication, such as severe preeclampsia, or clear CTG abnormalities, such as recurrent late decelerations. After 32 + 0 weeks, the timing of delivery was according to local management protocol

Intrauterine growth restriction (IUGR) was assessed using various parameters were observed including: Abdominal circumference (AC), Biparietal Diameter (BPD, Head Circumference (HC), Femoral Length (FL), FL/AC ratio, HC/AC ratio, Amniotic Fluid Index (AFI) using the four quadrant technique and Serial Growth Charts & umbilical artery Doppler studies.

IUGR infants admitted to NICU were followed up for perinatal complications like perinatal asphyxia, hypoglycemia, polycythemia, feed intolerance, necrotizing enterocolitis (NEC), sepsis and Hyperbilirubinemia. Continuous variables were reported using Mean±SD (standard deviation) for the normally distributed variables otherwise median and inter-quartile range was used

STATISTICAL ANALYSIS

Statistical analyses were done by using SPSS software version 22. Data Frequency, percentage, Mean and standard deviation were calculated. P value <0.05 considered statistically significant

RESULTS

A total of 53 diagnosed cases of IUGR were enrolled and analysed in our study for determination of perinatal outcomes.

Majority of the cases were in the category of 2.25 to 2.5 kg (41.5%), followed by 30.18% in the 2 – 2.24 kg group. The mean birth weight was 2.071 ± 0.371 kg. Details shown in table::1

Table 1: Birth Weight of IUGR neonates

Birth Weight (kg)	No of cases (n=53)	Percentage (%)
1 – 1.49	4	7.54
1.5 – 1.9	11	20.75
2 – 2.24	16	30.18
2.25 – 2.5	22	41.5

Neonatal outcome of IUGR babies was seen with respect to Cord pH and NICU admissions. The minimum cord pH was 6.9. Most of the cases (94.3%) had a cord pH of more than or equal to 7.1. They were all admitted in NICU with birth asphyxia. Two of these were put on ventilator of which one had extremely LBW neonatal death due to pulmonary hypertension and GI bleed. There were no cases of stillbirth. Neonatal morbidity was analyzed by considering the indications for NICU admissions (52.8%); the indications being cases of Low birth weight mainly for observation (64.3%). Detail description of neonatal morbidity was shown in table:2

Table 2: Neonatal outcome and morbidity of IUGR infants

Variable		No of Cases (n=53)	Percentage (%)
Neonatal Outcome (n=53)	Cord pH ≥ 7.1	50	94.33
	Cord pH ≤ 7.0	3	5.66
	NICU Admission	28	52.83
Neonatal Morbidity(n=28)	Low Birth Weight	18	64.28
	Hypoglycemia	2	7.14
	Hyperbilirubinemia	2	7.14
	Anomalies	2	7.14

	Birth Asphyxia	4	14.28

Asymmetrical and symmetrical IUGR cases were also compared in terms of good and poor perinatal outcome. Good outcome included cases with no NICU admissions and cord pH > 7.1. Poor outcome included cases with NICU admissions and cord pH ≤ 7.1. Clinically there was almost a 30% difference in the perinatal outcome of asymmetrical versus symmetrical IUGR babies, with asymmetrical babies having a poorer outcome. This difference did achieve statistical significance P >0.05.

Table 2: Neonatal outcome of Asymmetrical v/s Symmetrical IUGR infants

Neonatal outcome	Asymmetrical IUGR (n=35)	Symmetrical IUGR (n=18)	P Value
Birth wt < 2	12(34.28)	3(16.66)	> 0.05
Cord pH ≤ 7.1	8(22.85)	2(11.11)	
NICU admission	23(65.71)	5(27.77)	
Poor outcome	23(65.71)	6(33.33)	< 0.05
Good outcome	12(34.28)	12(66.66)	

The perinatal outcome of the IUGR babies was compared in male and female infants in terms of Cord pH ≤ 7.1, Caesarean section and NICU admissions. There were clinically similar results of Caesarean section in both males and females, but slightly more cases of Cord pH ≤ 7.1 and NICU admissions in males as compared to females, but this was not statistically significant (p>0.05).

Table 3: Perinatal outcome of IUGR babies by Gender

Outcome	Males (n=31)	Females (n=22)	P Value
Cord pH ≤ 7.1	7	3	> 0.05
Caesarean section	15	15	
NICU admission	17	11	

DISCUSSION

Parity, age and socioeconomic status are inter correlated and may also influence the pregnancy and the infant's birth weight, which lead to association with IUGR [14].

The fetus with IUGR and maternal risk factors were delivered as preterm in majority of the women in this study. One of the reasons includes termination of the pregnancy to reduce the maternal morbidity and mortality in cases like eclampsia. Other reason for preterm delivery is fetal distress and insufficiency of fetal-placental circulation. In a study by Setia S et al [15], also showed that majority of the mothers with IUGR who have risk factors will deliver preterm babies.

In contrast to the findings of Friars et al [16], and Jamal et al [17], who reported that extremes of maternal age adversely affect pregnancy outcomes, the researcher in this study did not find a significant effect. This may relate to the lower prevalence of extremes of maternal age in this study compared with theirs and hence a reduced power to detect an effect.

Present study found the mean birth weight of babies in symmetrically IUGR was 2.152 ± 0.366 gms and asymmetrically IUGR was 2.029 ± 0.374 gms, which was comparable to the mean birth weight observed by Valsa CA et al [18] and Villar et al [19]. On the other hand Lin et al [20], showed that the mean birth weight of symmetric IUGR infants was significantly lower than that of asymmetric IUGR infants (2167 ± 260 versus 2385 ± 105 gms).

In our study asymmetric IUGR were more than symmetric IUGR cases and also asymmetrically IUGR required more NICU admissions as compared to symmetrically, our finding are similar with the Sharma et al [21] and dash et al [22].

Low birth weight and Birth Asphyxia were the most common factors for neonatal morbidity in current study, concordance to Matharu K et al [23].

In this study the perinatal outcome of asymmetrical IUGR babies was worse as compared to symmetrical IUGR babies. The perinatal outcome was observed in relation to Birth weight, Cord pH and NICU admissions, our results correlate with the many other studies: Unterscheider et al [24], Lubrano, C et al [25] and Shivprasad B et al [26].

CONCLUSION

IUGR is associated with high perinatal morbidity and mortality. It is important for obstetricians and perinatologist to recognize the fetus(es) at risk of IUGR. The foremost priority is to establish the dating criteria and further identify the modifiable risk factors and optimize the maternal systemic disease. Vigilance towards antenatal risk factors for poor pregnancy outcome is important for the optimal management of IUGR pregnancies

REFERENCES

1. American College of Obstetricians and Gynecologists. Intrauterine growth restriction. Practice Bulletin no. 12, 2000, Washington DC. Available at: http://www.acog.org. Accessed 7 August 2014
2. American College of Obstetricians and Gynecologists. ACOG practice bulletin no. 134: fetal growth restriction. Obstet Gynecol. 2013; 121:1122–33.
3. American College of Obstetricians and Gynecologists.

Intrauterine growth restriction. Practice Bulletin no. 12, 2000, Washington DC.http://www.acog.org. Accessed 25 Dec 2012.
4. Boulet SL, Alexander GR, Salihu HM, Kirby RS, Carlo WA. Fetal growth risk curve-Defining levels of fetal growth restriction by neonatal death risk. Am J Gynecol. 2006; 195(6):1571-7.
5. Bernstein I, Gabbe SG. Intrauterine growth restriction. In: Gabbe SG, Niebyl JR, Simpson JL, AnnasGJ, et al., eds. Obstetrics: normal and problem pregnancies. 3d ed. New York: Churchill Livingstone,1996:863–86.
6. Manning E, Corcoran P, Meaney S, Greene RA, Perinatal Mortality in Ireland, Annual Report 2011. NPEC, Cork, 2013
7. National Perinatal Reporting System (NPRS): Health Research and Information Division, the Economic and Social Research Institute. Ireland: Perinatal Statistics Report; 2010.
8. Unterscheider J, Daly S, Geary MP, McAuliffe FM, Kennelly MM, Morrison JJ, O'Donoghue K, Hunter A, Burke G, Dicker P, Tully E, Malone FD: Optimizing the definition of intrauterine growth restriction–results of the multicenter prospective PORTO study. AJOG 2013, 208(4):290.e1-6.
9. Pallotto, E.K.; Kilbride, H.W. Perinatal Outcome and Later Implications of Intrauterine Growth Restriction. Clin. Obstet. Gynecol. 2006, 49, 257–269.
10. Henrichs, J.; de Jonge, A.; Westerneng, M.; Verfaille, V.; Franx, A.; van der Horst, H.E.; Bosmans, J.E.; IRIS Study Group. Cost-Effectiveness of Routine Third Trimester Ultrasound Screening for Fetal Growth Restriction Compared to Care as Usual in Low-Risk Pregnancies: A Pragmatic Nationwide Stepped-Wedge Cluster-Randomized Trial in The Netherlands (the IRIS Study). Int. J. Environ. Res. Public Health **2022**, 19, 3312
11. Gardosi J, Madurasinghe V, Williams M, Malik A, Francis A: Maternal and fetal risk factors for stillbirth: population based study. BMJ 2013, 346:f108.
12. Briana DD, Puchner AM. Intrauterine growth restriction and adult disease: the role of adipocytokines. European J Endocrinol. 2009;160(3):337-47.
13. Barker DJ, Gluckman PD, Godfrey KM, Harding JE, Owens JA, Robinson JS. Fetal nutrition andcardiovascular disease in adult life. 1993;41(8850):938-41
14. David peleg, colleen m. Kennedy and stephen k. Hunter, Intrauterine Growth Restriction: Identification and Management, AAFP, https://www. aafp.org/ pubs/ afp/issues/1998/0801/p453.html
15. Setia S, Sridhar MG, Bhat V, Chaturvedula L. Growth hormone in intrauterine growth retarded newborns. Ind J Pediatr 2007;74:991-994
16. Friars AE, Luikenaar RA, Sullivan AE, Lee RM, Porter TF, Branch DW, Silver RM. Poor obstetric outcome in subsequent pregnancies in women with prior fetal death. Obstet Gynecol 2004;104(3):521-526.
17. Jamal M, Khan N. Maternal factors associated with low birth weight. J Coll Physicians Surg Pak 2003;13:25-28.
18. **Valsa CA Thekkedathu,** Maternal and Placental Risk Factors associated with Intrauterine Growth Restriction and the Perinatal Outcomes, *Journal of South Asian Federation of Obstetrics and Gynaecology, September-December 2015;7(3):176-181*
19. Villar et al, "The differential neonatal morbidity of IUGR syndrome", Am. J. Obs and Gynae, 1990; 163(1): 151-157
20. Lin C.C., Shy Jon S., Philip L. River "Comparison of associated high risk factors and perinatal outcome between symmetric and asymmetric fetal IUGR" Am. J. Obs & Gyn 1991; 164(6): 1535-1541.
21. Sharma et al. Intrauterine Growth Restriction: Antenatal and Postnatal Aspects. *Clinical Medicine Insights: Pediatrics* 2016:10 67–83 doi: 10.4137/CMPed.S40070.
22. Jodi S. Dash et al, "Effects of symmetric and asymmetric fetal growth on pregnancy outcome", Obs and Gynae, 2000; 96(3): 321-327
23. Matharu K, Ozanne SE. The fetal origins of disease and associations with low birthweight. *NeoReviews*. 2004;5(12):e522–6
24. Unterscheider et al.: Fetal growth restriction and the risk of perinatal mortality–case studies from the multicentre PORTO study. BMC Pregnancy and Childbirth 2014 14:63.
25. Lubrano, C.; Taricco, E.; Coco, C.; Di Domenico, F.; Mandò, C.; Cetin, I. Perinatal and Neonatal Outcomes in Fetal Growth Restriction and Small for Gestational Age. J. Clin. Med. 2022, 11, 2729.https://doi.org/10.3390/jcm11102729
26. Shivaprasad B, Sharma D. To compare the perinatal outcome of IUGR infants with abnormal and normal antenatal umbilical artery doppler flow in the immediate neonatal period. Int J Reprod Contracept Obstet Gynecol 2017; 6:1449-54.