

A Descriptive Study of Maternal Risk Factors in Term Babies with Iugr

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Abstract:

Background: Term infants (>37 weeks gestation) who weigh <2500 g have intrauterine growth restriction (IUGR) and have a higher risk of mortality and morbidity. Few interventions likely to be beneficial like smoking cessation, balanced protein/energy supplementation during gestation which may prevent IUGR and its related complications.

Aims and objectives: To study maternal physical and socio-economic risk factors responsible for Intra Uterine Growth Restriction at full term (Term IUGR) among inborn babies and also to identify significant modifiable risk factors for IUGR in the locality, if any, and point out strategic measures to favourably modify those identified risk factors

Materials and methods: It is a descriptive, Matched pair, case-control study. The study was done on LBW babies born in Karpaga Vinayaga Institute of Medical Science & Research Centre, Kanchipuram, Tamilnadu during the period of January 2015-April 2016. This was a retrospective descriptive study of IUGR neonates with a birth weight below 70% of the expected whose mothers were admitted. Obstetrical and maternal risk factors and neonatal growth and outcome at six weeks, five months and 12 months of age were collected. 2553 babies were taken into the study, among them 508 Babies had low birth weight. Among 508 patients, 249 babies were IUGR at term, eligible for our study.

Results: Out of total 2553 live births during 16 months (January 2015 – April 2016), there were 508 LBWs, out of which 259 were preterms. From the remaining 249 who were SGAs, 137 term IUGR babies and their mothers were taken as the study sample and 140 controls of normal birth weight controls were chosen simultaneously from the post-natal wards. The male to female ratio among the babies was 1:1.1.

Conclusions: Maternal factors like Age, socio-economic status (SES), parity, height, pre-pregnancy weight, gestational weight gain, hypertension, anaemia, Previous history of IUGR, and adequacy of Anti-natal Check-up were significant and to pinpoint modifiable ones & suggest strategies to favourably modify IUGR at Full Term babies.

Keywords: IUGR, Maternal risk factor, LBW, Gestational weight gain

I. Introduction

Intrauterine growth retardation (IUGR) is the term describing a foetus that has not reached its genetic growth potential¹. Mortality and morbidity are increased in IUGR infants compared with infants who are appropriate for gestational age. IUGR infants have an increased risk of stillbirth, birth hypoxia, long-term consequences including short stature, impaired neurological development, diabetes and hypertension².

Infants who are born with low birth weight (LBW; birth weight <2500 g) are divided into 2 categories: those born too early and those born too small. Those born too early or preterm infants have LBW primarily because they did not have adequate gestational time to develop and grow fully. Term infants (>37 weeks gestation), who despite having adequate time to grow, are born too small and weigh <2500 g, have intrauterine growth restriction (IUGR). Although preterm infants may also have IUGR, for this study, we focus on term infants with IUGR⁴.

The 2 categories of LBW—preterm delivery (PTD) and IUGR—are separate infant health outcomes and have different causes. Causes and risk factors for LBW, attributable to both PTD and IUGR, have been studied extensively, although earlier literature primarily grouped PTD and IUGR into the larger LBW category. Maternal risk factors for having an infant with LBW in general include non-Hispanic black race/ethnicity, young age, unmarried marital status, less education, lower income, smoking, poor nutrition, and having had a previous infant with LBW. Few studies have examined the association between psychosocial factors and the risk of IUGR specifically. We conducted this study to correlate various maternal factors like age, socio-economic status, weight etc. which plays role in development IUGR babies who born at Term³.

II. Methods

It is a Descriptive; Matched pair, case-control study

Study area: Obstetric wards of Karpaga Vinayaga Institute of Medical Science & Research Centre, Kanchipuram, Tamilnadu with about 160 deliveries per month.

Study population: Inborn babies and their mothers

Sample size and technique: The prevalence of IUGR is taken as 10 % of all live births based on labour ward records of the institution. The sample size required was 540 each for both cases and controls. In this study total 137 cases and 140 controls were studied because of time constraints. Anticipating 90% power and 0.05 significance level with an expected prevalence of 10% the sample size calculated was 540 cases and 540 controls.

Data Collection:-The study was done on LBW babies born in Karpaga Vinayaga Institute of Medical Science & Research Centre, Kanchipuram during the period of January 2015-April 2016. List of LBW babies was obtained from the Birth Register maintained in the Labour Ward and the gestational age of the babies was assessed at bedside based on details on IP chart and clinically by using scoring system. Mothers of term IUGR babies were interviewed to fill a printed structured questionnaire, after obtaining their consent. Certain clinical details were obtained from their OP cards and IP charts with patients' consent and permission from their Obstetricians. The collected data were filled up by the principal investigator on the study proforma. Controls too were selected from the register, as far as possible the normal birth weight baby of the same sex documented closest (in serial order) to the selected "case" in the birth register and their mothers were interviewed and clinical details collected and documented by a similar procedure as for "cases".

Inclusion criteria:

Cases: 1. Delivered in the hospital during the study period (Inborn) 2. Birth weight < 2.5 kg, 3. Gestational age between 37-41 weeks (assessed clinically within 24 hours of birth by Dubowitz scoring). **Controls:** i. Inborn, delivered on the same date or one day before or after a "case" ii. Term baby by dates. iii. Same sex as that of the "case" iv. Birth weight > 2.5 kg.

Method of Data Analysis / Statistical Methods:-

1. Data collected were tabulated in a Microsoft Excel™ data sheet and analyzed using SPSS version 12 statistical software.
2. Risk factors were analysed using Chi-square test and adjusted odds ratio with 95% confidence interval was calculated. 'P value' < 0.05 was taken as statistically significant.
3. Further analysis by Conditional Logistic Regression was done to find out potential confounding effects.

III. Results

Intra Uterine Growth Restriction (IUGR) constitutes the larger part of LBW infants being born in developing countries. Various maternal risk factors are reported to be responsible for IUGR, but the relative importance of each will vary in different communities and geographical areas. This study tried to find which among a selection of 11 commonly reported factors (age, socio-economic status (SES), parity, height, pre-pregnancy weight, gestational weight gain, hypertension, anaemia, Previous history of IUGR, and adequacy of Ante-natal Check-up (ANC)) were significant among a predominantly rural population attending a 300 bedded Secondary level Hospital of north Tamilnadu. The salient observations were:

1. Out of total 2553 live births during 16 months (January 2015 – April 2016.), there were 508 LBWs out of which 259 were preterm. From the remaining 249 who were SGAs, 137 term IUGR babies and their mothers were taken as the study sample and 140 controls of normal birth weight controls were chosen simultaneously from the post-natal wards. The male to female ratio among the babies was 1:1.1.

2. 39.5% women were from lower SES in whom 56.9% had IUGR. In the upper and middle income group only 44.6% had IUGR babies. SES was a significant risk factor on Chi square test but on Conditional Logistic Regression (CLR) analysis for significance as independent risk factors, neither SES, maternal occupation or education were significant.

3. The study had 89 mothers of age < 21 years of whom 58.4% had IUGR babies. 37.9% of the total IUGR babies were born to mothers with age < 21 years. Significant association was found for maternal age as a risk factor on Chi square test but not on CLR

4. Parity was not found to be correlated with risk of IUGR 51.2% subjects were primi, of whom 54.9% gave birth to IUGR babies. 43.7% of multigravidas had IUGR.

5. 16.6% women were shorter than the chosen height cut off of 150 cm. Among them 69.6% had IUGR babies. Height was significant as a risk factor but not independently significant

6. Pre pregnancy weight is reflective of mothers nutritional status. 30% were < 45 kg, among whom 64.7% gave birth to IUGR babies. 44.7% of IUGRs were born to mothers whose weight was < 45 kg. Pre-

pregnancy weight < 45 kg, like many other factors mentioned, was found to be a significant risk though not an independent risk factor.

7. 64.2 % women failed to gain weight more than 10 kg during pregnancy and of them 59.4% gave birth to IUGR babies. This was significant on both sets of statistical tests; thus considered to indicate significant independent risk. 73.9% IUGR infants were born to these mothers with poor weight gain.

8. Pre delivery weight of < 55 kg was significant risk factor and was independent of other factors. 41.1% had pre delivery weight < 55 kg of whom 67.5% delivered IUGR babies. Out of 137 IUGRs, 56. % were born to mothers with weight < 55 kg

9. Only 10 women were found to have systolic hypertension with Systolic BP > 140 as cut off. Among them 80% had IUGR babies. Among the 137 IUGR only 5.8% were born to these mothers. Owing to the low prevalence of hypertension, it did not reach significance as a risk factor in our study.

10. For diastolic BP, > 90mm was taken as significant. Only 12 women had diastolic hyper-tension and 83.3% among them had IUGR babies. Diastolic BP > 90 was found to be a significant risk factor, only on Chi square test. It had no independent significance.

11. The incidence of anaemia was very high—79 % among the controls and 84.6% among mothers who had IUGR babies. Among anemic mothers who bore IUGR babies, 49.1% had mild, 50% had moderate and 1 woman had severe anaemia. Due to the high prevalence in both groups, anaemia could not be statistically proven to be a risk factor.

12. Among 135 multigravidae, 58 (43%) had birth spacing < 18 months. 53.4% of them had IUGR babies. 55.3% of IUGR babies were born when Inter pregnancy interval was < 18 months. This was significant as risk factor, though not independently.

13. Out of the 135 multiparous women, 35 (25.9%) had delivered an IUGR baby previously. Of these 35, 21 (60%) gave birth to an IUGR baby in the next delivery which was in the study period. This was significant as a risk factor but not independent.

14. Number of ANC visits > 3 was taken as an indicator of adequacy of ANC. 9% of the women (25 / 277) had not had adequate ANC visits according to this criterion. Only 8 of these 25 women had IUGR babies, thus contributing to 5.8% of IUGR deliveries. 94.2 % of the IUGRs were born to the 91% mothers who had adequate ANC visits. This paradoxical finding could be a result of multiple factors like inappropriate definition of adequacy of ANC, errors in documentation of visits, selection bias in a secondary care setup where more complicated patients come for follow-up etc.

15. In the background of Tamilnadu's impressive Public health achievements in areas of population control, institutional delivery rates, reductions in IMR & MMR, our study threw up some surprising pointers of Public health significance—80% prevalence of anaemia in pregnant women, 32% mothers less than 21 years of age, 43% women get pregnant again within 18 months of a first delivery and 9% turn up at last moment for delivery at secondary level centre without proper ANCs.

IV. Discussion

A matched pair case-control study on 137 term IUGR babies and 140 normal birth weight controls conducted among a predominantly rural population attending a 300 bedded Secondary level Hospital of South Tamilnadu tried to find which among 11 commonly reported risk factors (age, socio-economic status (SES), parity, height, pre-pregnancy weight, gestational weight gain, hypertension, anaemia, Previous history of IUGR, and adequacy of Ante-natal Check-up (ANC)) were significant and to pinpoint modifiable ones & suggest strategies to favourably modify them. Data on each factor was analysed sequentially by Chi Square test followed by Conditional logistic regression (CLR). Of the 11, 2, Pre-delivery weight <55kg & weight gain <10 kg during pregnancy were found to be the most significant determinants with independent significance on CLR test. It is noted that these 2 are not solely risk factors but potential manifestations of IUGR too. Among the other 9, maternal age <21years, low SES, height < 150cm, and pre-pregnancy weight < 45kg were found significant on chi square test though failed to show independent effect on CLR. This denotes a complex interplay of these factors, co-existing in same subjects, potentiating the effects of each other, yet confounding statistical test results. Parity had no effect but short interpregnancy interval <18 months was found to be a significant risk in multiparae. Previous h/o an IUGR birth had no notable effect on the birth weight of the next baby. Anaemia was rampant among cases & controls with ~80% prevalence and hypertension was quite rare <5%. So, the significance of these 2 intuitively relevant factors could not be demonstrated statistically. ≥ 3 ANCs did not seem to have any protective effect; this is attributed to various factors including methodological flaws.

V. Conclusion

A complex interplay of many maternal factors, co-existing in same subjects, potentiating the effects of each other are the main causes for IUGR in full term babies. Early prediction, identification of these risk factors and proper management may prevent infant mortality and related morbidities.

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Table 1: Risk Factors for IUGR—CHI Square Test:

Risk factor		Cases	Controls	P value	OR (95% CI)
Age of Mother	>21 years	85(45.2%)	103(54.8%)		1.703
	< 21 years	52(58.4%)	37(41.6%)	0.004	(1.023-2.836)
Socioeconomic Status	upper & middle	75(44.6%)	93(55.4%)		1.636
	Lower	62(56.9%)	47(43.1%)	0.047	(1.006-2.659)
Parity	Multi	59(43.7%)	76(56.3%)		1.570
	primi	78(54.9%)	64(45.1%)	0.062	(0.977-2.523)
Height	>150cm	105(45.5%)	126(54.5%)		2.743
	<150cm	32(69.6%)	14(30.4%)	0.003	(1.390-5.411)
Pre pregnancy weight	>45kg	68(44.4%)	85(55.6%)		2.292
	<45 kg	55(64.7%)	30(35.3%)	0.003	(1.326-3.961)
Weight gain in Pregnancy	<10 kg	91(59.47%)	62(40.52%)		2.431
	>10 kg	32(37.64%)	53(62.35%)	0.002	(1.41-4.192)
Pre Delivery Weight	>55Kg	60(36.8%)	103(63.2%)		3.573
	<55 Kg	77(67.5%)	37(32.5%)	0.000	(2.156-5.920)
Systolic BP	Normal	129(48.3%)	138(51.7%)		4.279
	>140 mmHg	8(80%)	2(20%)	0.058	(0.892-22.53)
Diastolic BP	Normal	127(47.9%)	138(52.2%)		5.433
	>90 mm Hg	10(83.33%)	2(16.66%)	0.019	(1.17-25.272)
Anaemia	Severe	1(50%)	1(50%)		
	Moderate	58(46.4%)	67(53.6%)	0.399	0.801
	Mild	57(57%)	43(43%)		(0.499-1.286)
	Normal	21(42%)	29(58%)		
Interpregnancy interval	>18months	25(33.8%)	49(66.2%)		2.250
	<18 months	31(53.4%)	27(46.6%)	0.033	(1.111-4.558)
Previous IUGR*	h/o Yes	21(60%)	14 (40%)	0.024	2.447
	No	52 (52%)	48 (48%)		(1.113-5.380)
Number of ANC visits	<3 visit	8(32%)	17(68%)	0.056	1.634
	>3 visit	129(51.2% }	123(48.8%		(0.986-2.707)