

## INCIDENCE AND RISK FACTORS FOR LOW BIRTH WEIGHT AMONG TERM SINGLETONS AT THE UNIVERSITY OF BENIN TEACHING HOSPITAL (UBTH), BENIN CITY, NIGERIA.

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### ABSTRACT

**Objective:** Low birth weight (less than 2500g) is a cause of increased neonatal morbidity and mortality. This study aims to determine the incidence of and risk factors associated with delivery of low birth weight singletons at term at UBTH, Benin City.

**Study Design:** This was a review of retrospective data extracted from the case records of all booked parturients who had low birth weight singletons at term at the Teaching Hospital over a four-year period. Booked parturients just before and after each case who had normal birth weight infants at term served as controls.

**Results:** Term low birth weight singletons constituted 3.4% of the 4735 term deliveries at the UBTH Benin City. Six parameters were found to have significant association with term low birth weight delivery. Birth interval of less than 2 years lost this association after controlling for confounding variables. Hypertensive disorder of pregnancy was the most significant risk factors isolated. Others were nulliparity, social classes IV and V, and maternal anaemia.

**Conclusion:** Low birth weight in term infants is a major determinant of neonatal and infant morbidity and mortality. All isolated risk factors but nulliparity are amenable to antenatal management.

**Key words:** Low birth weight, Term, morbidity, risk, singletons, Benin City. (Accepted 17 July 2006)

### INTRODUCTION

Birth weight remains a primary parameter in the evaluation of intrauterine growth processes. It is one of the few unambiguous measurements made in Obstetrics and applied routinely throughout the world<sup>1,2</sup> and has been recognized as a sensitive index of the health status in a population of newborns<sup>3</sup>.

Low birth weight defined as birth weight less than 2.5kg irrespective of gestational age<sup>4</sup> is associated with increased perinatal morbidity and mortality<sup>5</sup>. Later sequelae include sudden infant death syndrome, infant mortality as well as cognitive and neurological impairment<sup>6</sup>. Later in life surviving infants are prone to hypercholesterolaemia, cardiovascular diseases, diabetes mellitus and renal disease<sup>6,7</sup>.

Low birth weight is often the end of a spectrum of fetal growth restriction hence factors predisposing to intrauterine growth restriction eventually results in birth of an infant with sub optimal weight. Nevertheless, low birth weight is not entirely

pathological as it includes constitutionally small but normal babies. The identification of pregnancies at risk for intrauterine growth restriction (IUGR) ideally begins at the booking clinic and recognition of these factors would form a rational basis for proper and adequate intervention to reduce its incidence and manage any attendant complication. There are very few published works on low birth weight from this locality. This forms the basis of this study.

### MATERIALS AND METHODS:

This was a retrospective study conducted in the department of Obstetrics and Gynaecology of the University of Benin Teaching Hospital (UBTH) Benin City. It spanned a four-year period, January 1<sup>st</sup> 2000 to December 31<sup>st</sup> 2003. The department has 42 gynaecological and 84 obstetric beds and undertakes about 1200 deliveries annually. The department keeps strict records of all deliveries in the unit using the obstetric data sheet designed for that purpose and kept safe in the departmental record office.

The obstetric data sheet comprises sections on; the antenatal history, physical findings/measurements and investigations; labour history, physical findings and events leading to delivery as well as delivery

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Events leading to delivery as well as delivery details; immediate neonatal assessment; the immediate postpartum period; and the postnatal clinic findings. It is filled for each parturient initially upon delivery using her antenatal and delivery records and thereafter at the point of discharge from the postnatal ward and finally at the postnatal clinic. Resident doctors on labour ward posting review these data periodically to ensure accuracy and completeness. This study included all booked parturients who delivered low birth weight infants at term (defined here as birth weight less than 2.5kg from 37 completed weeks to 42 weeks) and who do not fall within the exclusion criteria. The exclusion criteria included parturients with twin or higher order multiple pregnancies, infants with congenital abnormalities, macerated stillbirth, diabetic mothers and those with unknown or doubtful gestational age. A routine ultrasound study for dating is not done in our centre and this was a limitation in accurate dating of the pregnancy. However, recruited parturients were sure of their last menstrual periods, some were literate, kept menstrual records, were not on any hormonal contraceptives nor had unexplained amenorrhoea before index pregnancy. Those with irregular menstrual cycles prior to pregnancy were also excluded from the study. Moreover, the symphysio-fundal heights of the subjects (cases) were compatible with their dates at booking; and some of them had obstetric scan for other purposes which also confirmed their gestational dates.

For each selected case, the parturient just before and the one just after her who achieved delivery of a normal birth weight infant at term were chosen as controls. Case records and the corresponding obstetric data sheets of selected subjects and controls were retrieved. Relevant information was extracted from the records and these related to their socio-demographic characteristics, anthropometric parameters, obstetric history, antenatal complications, laboratory investigations and perinatal outcome.

All information obtained was collated on a data collection sheet designed for the study. The coded data was fed into the computer and analyzed using the Epi info statistical software package version 3.2. Univariate analysis was performed and percentages calculated. Test of statistical significance was carried out using the chi square test with Yates correction or Fisher exact adjustment where appropriate. A p value less than 0.05 was taken as significant. The degree of association between the significant risk factors isolated and low birth weight was computed using the Mantel Haenszel weighted Odd ratio (95% confidence interval) while controlling for confounding factors.

## RESULTS

The incidence of low birth weight term singletons in this study was 3.4% as there were 161 term singletons who weighed less than 2.5kg of a total 4735 term deliveries during the study period. The mean birth weight of the cases was  $2.26 \pm 0.21$ kg as against the mean of  $3.14 \pm 0.35$ kg for the controls. The mean birth weight of the females among the cases was comparable with that of the males ( $2.29 \pm 0.17$ kg and  $2.22 \pm 0.26$ kg respectively).

In table 1, the socio demographics of the parturients were examined. No statistical significant differences were noted in the ages of the parturients with low birth weight infants and those with normal birth weight deliveries (p value of 0.99, df=3). The social status and not the actual occupation of the parturients mattered. The lower socio economic classes being strongly associated with the risk of having a low birth weight infant at term. The chi square for trend was very significant at 22.64, p value less than 0.0001.

Nulliparas were more likely to have low birth weight infants at term than were women of higher parities, and this was significant statistically. (p value less than 0.001). Birth interval less than 2 years was associated with the risk of a low birth weight infant (p value 0.015). The history of a previous term low birth weight in earlier pregnancies had no significant association with the risk of having low birth weight infant in current pregnancies by women of higher parities.

Anthropometric parameters at booking for the 100 subjects and 222 controls respectively who booked before the 20<sup>th</sup> week of gestation had no significant association with the risk of low birth weight delivery. Parameters evaluated were, weight at booking, the body mass index (BMI) and weight gain in pregnancy. (Table 2).

Hypertensive disorders in pregnancy (table 3) and maternal anaemia were the only significant antenatal risk factors identified to be associated with having a low birth weight infant at term (p values 0.01 and 0.009 respectively). The other factors examined included antepartum haemorrhage, malpresentation, malaria, HIV and VDRL positive status. These had no significant association. Though there were more females with low

birth weight (56.5%) than males (43.5%) as against 49.7% of females and 50.3% of males among the controls, the sex of the infant had no association (p value 0.440, df=1)

The measure of association between isolated risk factors was evaluated by in table 4. Five of the six factors that had significant association with term low birth weight delivery retained this association after controlling for confounding variables using the Mantel Haenszel weighted odd ratio.

These included low Socio-economic classes( V and IV) with OR 3.87 and 3.23 respectively. Hypertensive disorders in pregnancy had the greatest association with low birth weight, OR 4.42 (95% CI 1.31 - 17.00). The calculated OR for anaemia in pregnancy was 2.80 (95% CI 1.24 - 6.36). The others were nulliparity OR = 2.64 (1.46 - 4.26). The association with birth interval less than 2 years was lost after controlling for confounding variables.

**Table 1: Socio Demographic Characteristics of Parturients with Term Low Birth Weight Singletons.**

Characteristics	Cases n=161		Controls n=322		P Value	
		%		%		
Age(years)	<20	4	2.5	6	1.9	0.95
	20-29	86	53.4	33	41.3	
	30-39	70	43.5	172	53.4	
	≥ 40	1	0.6	11	3.4	
Social Status	1	3	1.9	13	4.0	..0.001
	11	15	9.3	99	30.7	
	111	30	18.6	95	29.5	
	1V	72	44.7	78	24.2	
	V	41	25.5	37	11.5	
Occupation	Skilled	75	46.6	142	44.1	0.95
	Business	37	23.0	75	23.3	
	Unskilled	31	19.2	45	14.0	
	Housewife	18	11.2	60	18.6	

**Table 3: Antenatal Complications And Term Low Birth Weight.**

Antenatal factors	Cases n=161		Control n=322		P Value
		%		%	
Hypertensive disorder	20	12.4	10	3.1	0.01
Antepartum haemorrhage	7	4.3	9	2.8	0.43
Malpresentation	5	3.1	13	4.0	0.56
Anaemia	36	22.4	30	9.3	0.009
Malaria	11	6.8	19	5.9	0.715
HIV positive status	4	2.5	2	0.6	0.258
VDRL positive status	4	2.5	2	0.6	0.258

**Table 2: Anthropometric Characteristics and Term Singleton Low Birth Weight**

Parameter	Cases n*=100		Control n*=122		P Value
		%		%	
<b>Booking weight(kg)</b>					
<50	8	8.0	3		2.5
50-90	87	87.0	110		90.2 0.99
>90	5	5.0	9		7.3
<b>Body Mass Index</b>					
<18.5	8	8.0	12		9.8
18.5-24.9	53	53.0	67		54.9
25-29.9	30	30.0	35		28.7 0.902
30-34.9	7	7.0	6		4.9
≥35	2	2.0	2		1.6
<b>Weight gain in Pregnancy (kg)</b>					
<12.5	94	94.0	103		84.4
12.5-18	4	4.0	13		10.7 0.831
>18	2	2.0	6		4.9

\*61 and 100 of the cases and controls booked beyond the 20<sup>th</sup> week of gestation and were excluded from this analysis

**Table 4: Isolated Risk Factors For Term Low Birth Weight Among Singletons At UBTH, Benin City.**

Factors	Odd Ratio
Hypertensive disorders	4.42
Social class V	3.87
Social class IV	3.23
Anaemia in Pregnancy	2.80
Nulliparity	2.56

## DISCUSSION

Low birth weight singletons at term constituted 3.4% of all deliveries in our centre during the study period. This incidence is lower than earlier reports from Lagos and Ilorin.<sup>3,8</sup> The two studies however made no distinction between preterm and term low birth weight delivery. Low birth weight infants are usually a result of preterm birth and/or intra uterine growth restriction<sup>9</sup>.

Some earlier studies had shown a correlation between maternal age at the extremes of reproductive life as well as maternal occupation and low birth weight delivery<sup>8,10,11</sup>, our study did not prove such association.

However, in consonance with other studies<sup>3,10</sup>, there was an increased risk of low birth weight delivery among women in the lower echelons of the socio economic class. This association was retained even after controlling for confounding variables. The calculation of social class in this study was based on maternal educational status and the occupation (income) of her spouse as devised for the African population<sup>12</sup>. Nutritional deprivation often seen among the poor in the society may precipitate delivery of a low birth weight infant<sup>9</sup>.

Considering the obstetric history, a birth interval less than 2 years was associated with low birth weight at term as was also noted in an earlier study<sup>13</sup> but this association was lost after adjusting for confounding variables in our study. Primigravidae also stood a high risk of low birth weight delivery at term. Nnatu at Lagos<sup>3</sup> and Feleke at Addis Ababa<sup>11</sup> noted similar findings. No anthropometric parameter in our series (booking weight, body mass index or weight gain in pregnancy) showed any association with low birth weight among term singletons. Nnatu<sup>3</sup> had shown such association while Simpson et al<sup>14</sup> reported a 2 fold risk for women weighing less than 45kg at the beginning of pregnancy. Mcfee<sup>15</sup> gave such critical weight as 50kg. A body mass index (BMI) of less than 19 at conception was shown to be associated with a 19% risk of low birth weight delivery at term compared with 8% for mothers with normal BMI<sup>16</sup>. This was not the case in our review. It was however noted that majority of the study subjects and controls booked later than 20 weeks gestation, thereby rendering weight calculations difficult. Those were excluded from such calculations hence reducing the sample population. This might have affected the results.

Of the antenatal complications evaluated, maternal anaemia showed a very significant correlation with increased risk of low birth weight delivery even after adjusting for confounding variables (table 4). Even though some authors believe that maternal anaemia in the absence of sickle cell disease or other inherited anaemias associated with serious maternal illness does not cause with intra uterine growth restriction (IUGR)<sup>17</sup>, it is noted that IUGR is associated with conditions of maternal oxygen deprivation as operable in anaemia<sup>9</sup>. Nevertheless, Nnatu<sup>3</sup> did not make similar observation in his Lagos study. Hypertensive disorders were the other antenatal factors isolated in this study (table 4). This is not surprising as IUGR said to be responsible for over 70% of cases of low birth weight at term has been shown to be associated with maternal medical conditions that interfere with the circulation

and the efficiency of the placenta as may be the case in hypertensive disorders of pregnancy<sup>9</sup>.

## CONCLUSION

Birth weight, an important index of intra uterine fetal growth is influenced by a number of factors operating in the prenatal period. Low birth weight is a major determinant of neonatal and infant mortality rates and contributes significantly to childhood morbidity<sup>5,6,9</sup>. Significant factors associated with this in our environment have been isolated in this series. These include: low socio economic status, maternal anaemia, hypertensive disorders of pregnancy and primigravidity. All these but for primigravidity are amenable to antenatal management.

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