

HIGH BIRTH WEIGHT BABIES: INCIDENCE AND FOETAL OUTCOME IN A MISSION HOSPITAL IN BENIN CITY, NIGERIA

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ABSTRACT

Objective: To determine the incidence of delivery of high birth weight (HBW) babies in Benin City and document their foetal outcome.

Methods: All babies with HBW (defined as birth weight $\geq 4000\text{g}$) were recruited into the study. The maternal records were examined for maternal age, parity, height, gestational weight gain and mode of delivery. The sexes, head circumferences and lengths at birth were documented. Foetal outcome such as stillbirth, birth asphyxia, Erb's palsy, fracture of the clavicles and the need for admission into the Special Care Baby Unit in HBW babies (study group) was compared with that of a control group.

Results: The incidence of delivery of a HBW infant was 8.1% with a male preponderance. Maternal parity and age influenced the incidence. The highest incidence was among para 4 women and those aged between 35 and 39 years. The lowest incidence was among para zero and teenage women respectively. Women with a history of delivery of a previous baby with birth weight of $\geq 4000\text{g}$, a gestational weight gain of 13-15 kg and a height $>1.63\text{m}$ had an increased tendency towards delivery of a HBW infant. High birth weight babies were at a higher risk of foetal death and delivery by Caesarean Section.

Conclusion: Incidence of delivery of HBW infant is relatively high in Benin-City. It is associated with increased rate of Caesarean delivery and foetal death.

Keywords: High birth weight, Incidence, Foetal outcome.

INTRODUCTION

High birth weight (birth weight $\geq 4000\text{g}$) neonates constitute a high-risk group because of the associated increased incidence of birth trauma such as fracture of the clavicle, nerve injuries, birth asphyxia, subdural haemorrhage and sometimes, foetal demise.¹⁻⁵ They, therefore, require specialised care and attention. However, little attention has been directed towards them. For instance, most of the previous studies on birth weights in Nigeria have focussed on mean birth weights⁶⁻¹⁰ and on low birth weights with their associated predisposing factors.¹¹⁻

¹⁵ The incidence of delivery of high birth weight (HBW) babies in Benin City and perhaps, other parts of Nigeria and Africa is not well established despite the well recognised increased perinatal morbidity and mortality observed among them.²⁻⁵

Three previous studies on foetal macrosomia in Nigeria were conducted over 15 years ago at the

teaching hospitals in Ife, Ilorin and Enugu respectively.^{2,3,5} In the study in Enugu, the cut-off value for foetal macrosomia was birth weight greater than 4500g which is in conformity with its definition in socio-economically advanced countries such as United States of America. In the other two studies, foetal macrosomia was defined as birth weight greater than 4000g . The average newborn infant in Europe and America weighs approximately 3400g with 95% of all their full-term newborns weighing between 2500g and 4600g .¹⁶ In comparison, the average full-term newborn in developing countries such as Nigeria weigh between 2900 3000g .¹⁶ In view of the lower mean birth weight of newborn infants in developing compared to developed countries, it may be more appropriate to adopt a lower cut-off value of 4000g and above in the former. More importantly, the 4000g and above cut-off point used in the present study is in keeping with the recommendations by the World Health Organisation in their ninth revision of the International Classification of Deaths and Diseases,¹⁷ that 500g grouping in international data should be

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changed from that of 3001-3500g, 3501 - 4000g, 4001- 4500g etc to: 3000-3499g, 3500-3999g, 4000 4499g, etc. Thus, further justifying the use of birth weight of 4000g and above as cut-off point for HBW in the present study. Teaching hospitals by their nature are referral centres. Therefore, data from such institutions are inevitably referral-biased. From this standpoint, a private hospital, which does not select patients and has a high annual delivery rate may provide more representative data. To the best of my knowledge, there is no report from private health institutions in Nigeria on HBW babies despite the fact that a significant proportion of our deliveries take place in them. This study sought to determine the incidence of delivery of high birth weight neonates in Benin City and document their foetal outcome.

SUBJECTS AND METHODS

This study was conducted at St Philomena Catholic Hospital, Benin City. The hospital was established 62 years ago and has a large maternity unit with an average of 1344 deliveries annually.⁷ It was chosen for the study because of its central location and its non-bias for social status stratification in Benin City.¹⁸

During the 3-year study period, 1st January, 2001 to 31st December, 2003 all babies with high birth weight (defined as birth weight 4000g) delivered in the hospital were recruited. The babies were weighed naked by a trained midwife within the first hour after birth using a Waymaster weighing scale. The scale was checked daily for zero error and also with known weights for reliability. The weights and sexes of the babies were recorded on a standard form according to the month and year of delivery. The head circumference and the crown-rump length were measured by the author using an inelastic tape. The Apgar Scores at one and five minutes were assessed and documented by the trained midwife or the attending Physician (including the author) using the Apgar Scoring System.¹⁹ At birth, all the babies were given either routine care or resuscitation as indicated by the baby's clinical condition. The babies were examined for evidence of congenital abnormalities. The serial and case numbers of each mother who delivered an infant with birth weight 4000g was obtained as well as the serial and case numbers of the next mother in sequential order who delivered a singleton infant with a normal birth weight (defined as birth weight between 2500g and 3999g¹). This identified the study and the control groups respectively. Each group, therefore, contained 266 mothers (with their babies). The foetal outcomes in both groups were compared. Similar comparison was made in respect of history of delivery of a previous

baby with birth weight 4000g. Each mother was interviewed and the medical record of each mother was reviewed to obtain information such as age, parity, booking weight, gestational age at booking, height, medical history and method of delivery. The foetal outcome at birth was noted.

Obstetric care was provided by 4 Senior Medical Officers (each with more than 6 years post-qualification experience) under the supervision of two Consultant Obstetrician and Gynaecologists.

In this study, the seasons were defined as the wet season (May to October) and the dry season (November to April) in accordance with the well recognised characteristics of the climate of Nigeria.²⁰ A high birth weight infants is one whose birth weight was 4000g and above. Normal birth weight was taken as birth weight between 2500g and 3999g.¹ Birth asphyxia was defined as Apgar score of 6 and below at one minute.²¹ Mild to moderate birth asphyxia was defined as Apgar score between 4 and 6 at one minute.²¹ Apgar scores of 3 and below were accepted as indicative of severe birth asphyxia.²¹ A primiparous woman is one whose parity is zero.²² A multiparous woman is one whose parity is 1 to 5.²²

Statistical analysis involved calculation of percentages, ratios, means and confidence intervals. The Z-test, the t-test and the chi square test were used in ascertaining the level of significance of differences, which was set at $p < 0.05$.

RESULTS

During the 3-year study period, there were 3303 deliveries, giving an annual delivery rate of 1101. High birth weight (HBW) occurred in 266 of 3303 deliveries, for an incidence of 8.1%. Of the HBW infants, 159 (59.8%) were males while the remaining 107 (40.2%) were females (Z-statistic = 3.050 $p < 0.01$). Male to female ratio was 1.5:1. The incidence of delivery of a HBW baby was slightly higher in the wet (8.6%) than in the dry (7.4%) season. (Z-statistic = 1.272 $p > 0.05$).

Foetal characteristics.

All the HBW babies were singleton pregnancies with an overall mean birth weight of 4245g (95% confidence interval (CI) = 4208 - 4282). The mean birth length was 51.6cm (95% CI = 51.4 - 51.8). The mean head circumference at birth was 35.7cm (95% CI = 35.6 - 35.8). Comparing the heaviest male with the heaviest female neonate, it was 5800g versus 5650g, with a weight difference of 150g.

Associated Maternal Factors in HBW Deliveries

The mean maternal age of HBW infants was 27.8 years (95% CI = 27.4 - 28.2), compared with 26.9 years (95% CI = 26.4 - 27.4) for mothers of control infants. Further details are shown in Table 1. The mean height of mothers of study (HBW) babies was 164.1cm (95% CI = 163.3 - 164.9) compared with 161.2cm (95% CI = 160.5 - 161.9) for mothers of control babies. Since most of the women did not know their pre-pregnancy weight, the weight at booking in the first trimester was used in calculating maternal gestational weight gain. Thus, the mean weight in 197 mothers of HBW infants who booked in the first trimester was 68.4kg (95% CI= 67.2 - 69.7). The corresponding mean weight for mothers of control infants was 66.6kg (95% CI= 65.3 - 67.9). Birth weights of previous babies were available in 191 of the mothers of HBW infants. Of this number, 62(32.5%) had a previous baby with birth weight 4000g. For the control group, birth weight of previous babies were available in 183 of the mothers and 12 (6.6%) of them had a previous baby with birth weight 4000g ($\chi^2 = 39.511$ p<0.001). As shown in Table 11, the highest and the lowest rates of delivery of HBW babies were among para 4 and para zero women respectively.

Table I: Maternal age and incidence of

Table I: Maternal age and incidence of delivery of HBW infants.

Maternal Age Groups (Years)	Total Deliveries(%)	Study No	Babies HBW(%)
≤ 15	6 (0.2)	0	0
16 - 19	80(2.4)	2	2.5
20 - 24	574(17.4)	40	7.0
25 - 29	1175 (35.6)	95	8.1
30 - 34	914(13.0)	71	7.8
35 - 39	430(13.0)	48	11.2
≥40	78(2.3)	7	9.0
Unknown	46 (1.4)	3	6.5
Total	3303(100.0)	266	8.1

Foetal outcome

During the study period, the stillbirth rate for the HBW pregnancies was 5.3%, corresponding to 11.0% of the total stillbirths. Of the 14 stillbirths, 9 (64.3%) were fresh while 5 (35.7%) were macerated. Incidence rate of birth asphyxia in HBW infants was 15.0%, corresponding to 9.5% of all birth asphyxial cases. None of the HBW infants was preterm. Caesarean delivery rate for HBW pregnancies was 32.7%, corresponding to 15.6% of the total Caesarean deliveries during the study period. Further details are shown in Table V. As shown in Table III, significantly more males than females were born with high birth weight. The modal birth weight group was 4000-4249g in both males and females respectively. As shown in Table I, women aged between 35 and 39 years had the highest tendency to deliver HBW babies. The lowest incidence was among teenage mothers (age ≤ 19 years). As shown in Table IV, gestational weight gain between 13 - 15kg was associated with significant increase in the risk of delivery of a HBW infant. Table V, shows that the risks of Caesarean delivery and foetal death were significantly higher in HBW than in control babies. Although there was a higher tendency towards occurrence of birth asphyxia in HBW babies, the difference was not statistically significant.

Table II: Maternal parity and incidence of delivery of HBW infants.

Maternal Parity	Total Deliveries (%)	Study Babies No	(HBW) %
0	1062(32.2)	58	5.5
1	660(20.0)	42	6.4
2	510 (15.4)	52	10.2
3	409(12.4)	35	8.6
4.	298(9.0)	43	14.4
5	188(5.7)	19	10.1
≥ 6	176 (5.3)	17	9.7
Total	3303(100.0)	266	8.1

Table III: Distribution of high birth weight babies by birth weight categories and by sex

Birth Weight Sexes	Male		Female		Both	
	No	%	No	%	No	%
4000-4249	104	65.8	71	65.7	175	65.8
4250-4499	29	18.4	24	22.2	53	19.9
4500-4749	9	5.7	8	7.5	17	6.4
4750-4999	7	4.5	1	0.9	8	3.0
5000-5249	6	3.8	3	2.8	9	3.3
5250-5499	1	0.6	0	0	1	0.4
5500-5749	1	0.6	1	0.9	2	0.8
5750-5999	1	0.6	0	0	1	0.4
TOTAL	155	100	08	100	266	100

Table IV: Comparison of maternal weight gain in pregnancy among mothers of HBW and control babies.

Maternal weight Gain in Pregnancy (kg)	Mothers of HBW babies		Mothers of control babies		Z-statistic (P-value)
	No	%	No	%	
<10	36	13.5	139	52.3	5.466 (<0.001)
10 – 12	47	17.7	48	18.0	0.038 (>0.05)
13 – 15	108	40.6	21	7.9	4.345 (<0.001)
>15	6	2.3	3	1.1	0.140 (>0.05)
Unknown	69	25.9	55	20.7	0.685 (>0.05)
Total	266	100	266	100	

Table V: Comparison of foetal outcome in HBW and control groups.

FOETAL OUTCOME	HBW GROUP (n = 266)		CONTROL GROUP n=266		Z Statistic (p value)
	No.	%	No.	%	
No. of live births	252	94.7	262	98.5	2.377 (<0.05)
No of Still births	14	5.3	5	1.9	0.398 (>0.05)
Caesarean delivery	87	32.7	35	13.2	2.545 (<0.05)
Birth asphyxia	40	15.0	29	10.9	0.507 (>0.05)
- Mild to moderate	30	11.3	23	8.6	0.328 (>0.05)
- Severe	10	3.7	6	2.3	0.164 (>0.05)
Erb's palsy	7	2.6	2	0.8	1.574 (>0.05)
Clavicular fracture	3	1.1	0	0	1.674 (>0.05)
SCBU admission	266	100.0	31	1.7	15.296 (<0.001)

SCBU = Special Care Baby Unit.

DISCUSSION

The incidence (8.1%) of delivery of high birth weight (HBW) infant reported herein is much higher than the 1.68% reported in 1991 from Ile-Ife, Nigeria.⁴ This difference may be explained, in part, by the fact that the cut-off birth weight value used in defining the study population in this study differ from that used in the study in Ife. In this study, HBW included babies who weighed 4000g at birth but in

the Ife-study only babies who weight above 4000g at birth were included. This may have contributed to the higher incidence obtained in the present study. It is also possible that the time interval (>12 years) between the two studies may have played some role in the higher incidence observed here. This view is supported by the report of two recent studies, which respectively demonstrated a trend towards higher mean birth weight in Nigeria.^{7,9} This is further

reinforced by the finding in this study that the heaviest neonate weighed 5800g as compared to 5500g reported from Enugu in 1988² and Ife in 1991³ respectively.

This study, as have others,²⁻⁴ revealed male preponderance of HBW babies. The reason is not clear. However, Ounsted speculated that it is due to the antigenic dissimilarity that the Y chromosome establishes, thus enhancing trophoblastic invasion, which in turn facilitates growth.²¹ Another explanation is that at term, the male fetus is heavier because of its greater lean body mass and less body fat than the female, possibly due to the effects of fetal testosterone production.²⁴

Para four women as well as those aged 35 to 39 years respectively showed the highest tendency towards delivery of HBW babies. Comparison was not possible because other reports did not indicate precisely which maternal age group or parity had the highest incidence of delivery of HBW babies.²⁻⁵ Our finding suggests that older multiparous women have a greater tendency towards delivery of HBW babies than young primiparous women. According to Jackson, multiparous women tend to be heavier than primiparous women at the start of pregnancy and are therefore, better able to support fetal growth from their endogenous reserves.²⁵ Since parity naturally increases with age, the same reason may explain the higher incidence of delivery of HBW infants in older women.

As in other studies,^{2,4,26} maternal factors found to predispose to delivery of HBW infant in this study include previous delivery of an infant with a birth weight of 4000g and above and excessive weight gain during the course of pregnancy. Also the mean height and weight of mothers of HBW babies was higher than those of the control group. Similar observation has been made by other investigators.^{2,27} Identification of these maternal factors associated with the delivery of HBW infants will help in alerting the physician to the possibility of its occurrence. Antenatal detection of the excessively large fetus may significantly reduce the morbidity and mortality experienced by these babies by allowing for planned mode of delivery and availability of skilled neonatal resuscitation.

In consonance with other studies,²⁻⁵ HBW infants were found to be at a higher risk of foetal death, birth asphyxia and Caesarean delivery. This may be explained by the increased incidence of obstructed labour due to cephalopelvic disproportion. Admission into the Special Care Baby Unit (SCBU) was significantly higher in HBW than in control babies. This finding may be explained by the admission policy of the hospital which makes

It mandatory for all high-risk neonates, which includes HBW infants, to be admitted for observation. The implication of the increased need for admission is that it will further stretch the human and material resources of the in-patient services of the hospitals, apart from the requirements for Caesarean delivery and neonatal resuscitation.

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