Obstetric Performance of Mothers with Fetal Macrosomia in Bida, North Central Nigeria.

[1]F.B. Adewale; [2]A.S. Adeniran; [2]M.A. Ijaiya; [3]A. Babalola.

[1] Obstetrics & Gynaecology Department, Federal Medical Centre, Bida, Nigeria.
[2] Obstetrics & Gynaecology Department, University of Ilorin/ University of Ilorin Teaching Hospital, Ilorin, Nigeria.
[3] Family Medicine Department, Federal Medical Centre, Bida, Nigeria.

Abstract

Fetal macrosomia remains an important determinant of perinatal outcome and a contributor to neonatal morbidity and mortality due to its possible attendant complications. The aim of the study was to determine the maternal characteristics, as well as neonatal and maternal outcome following delivery of macrosomic babies.

A descriptive study of deliveries that resulted in the delivery of macrosomic babies at the Federal Medical Centre, Bida, Nigeria was conducted over a five year period. The list of eligible parturient was compiled from the delivery registers, the case files were retrieved and relevant information extracted. Statistical analysis was with SPSS version 20.0 and $p<0.05$ was significant.

Out of 8141 deliveries, macrosomia occurred in 500 (6.1%); among the 480 cases analyzed, 345(71.9%) mothers of macrosomic babies were <35 years of age, the mean maternal weight at term was 89.42kg±2.50 while 297(61.9%) mothers had previous delivery of macrosomic babies. Also, 337(70.2%) women had vaginal delivery while maternal risk factors for fetal macrosomia were not statistically significant relative to the mode of delivery (p0.857). Maternal complications included perineal lacerations [90(18.8%)] and primary postpartum haemorrhage [82(17.1%)]. Maternal booking status (p0.001), male fetal gender (p0.001) and birth weight less than 4500g (p0.002) were significant predictors of vaginal delivery while maternal complications were significantly higher following vaginal delivery (p0.001). Low APGAR scores were higher following vaginal deliveries (p0.732); the perinatal mortality rate was 31/1,000 live birth (15/480) but there was no maternal death. This study revealed a high incidence of fetal macrosomia and vaginal delivery was associated with a high maternal and perinatal morbidity.

Key words: Obstetric Performance; Pregnancy outcome; Fetal macrosomia; Mode of Delivery.

Correspondence to:

Dr. F,B. Adewale
Obstetrics & Gynaecology Department,
Federal Medical Centre,
PMB 14, Bida, Niger State, Nigeria.
E-mail: drfolorunshoadewale80@yahoo.com

Introduction

Generally, fetal macrosomia is defined as birth weight of 4,000g or greater, or ultrasound estimated fetal weight of 4500g or more [1,2]. The American College of Obstetricians and Gynecologists (ACOG) defined macrosomia as neonates with an absolute birth weight greater than 4500g irrespective of gestational age or other demographic variables [3]. Despite the controversy, it is generally accepted that infants with birth weight above the 90th percentile on the population specific curves or above two standard deviations are large for gestational age (GA) or macrosomic [2,3]. However, there is an established association between fetal macrosomia and increased risk of fetal, neonatal or maternal morbidities and possible neonatal mortality.

Risk factors for fetal macrosomia include genetic, environmental and constitutional factors; pre-gestational high body mass index (BMI), excessive weight gain in pregnancy and gestational or pre-gestational diabetes [4]. Although clinical physical examination, maternal risk factor assessment and radiological evaluation may predict fetal macrosomia, the diagnosis is confirmed only by weighing the newborn after delivery.

Controversies on the best management modality of fetuses with macrosomia have remained unresolved on the diagnosis and mode of delivery. Diagnosis is a challenge because prenatal diagnostic methods based on clinical estimation and ultrasound scan (USS) are imprecise while obesity, co-existing uterine fibroid, multiple pregnancy and amniotic fluid volume affects clinical estimation. Antenatal accuracy of antenatal prediction of fetal macrosomia (>4000g) has sensitivity and specificity of 41.2% and 94.1% as well as positive and negative predictive values of 57.5% and 89.1% respectively [5]. Therefore, it has been suggested that a high index of suspicion should be exercised in women with previous macrosomia, high maternal pre-pregnancy weight, increased weight gain in pregnancy, multiparity, male fetus, postdated pregnancy as well as pre-gestational or gestational diabetes [6]. In addition, the mode of delivery remained controversial in medical literature, the options include expectant management with subsequent vaginal delivery, induction of labour (IOL) and elective caesarean section (CS). However, the role of elective CS has been questioned and a study estimated that 3,657 CS would be required to prevent one permanent brachial plexus injury [7].

This study aimed at determining the pregnancy outcome (neonatal and maternal) following delivery of macrosomic babies among parturient in Bida, Nigeria.

Methodology

The study was a retrospective descriptive study conducted at the Federal Medical Centre, Bida, Nigeria over a five year period. The inclusion criteria were delivery at the study centre of a singleton neonate with birth weight of 4000g or more. Parturient with babies whose birth weights were less than 4000g or birth at other facilities were excluded from the study.

For this study, macrosomia was defined as a birth weight of 4000g or more measured after separation of the placenta from the newborn[1,2]. A list of macrosomic singleton newborns during the study period was compiled from the delivery record book and the maternal and neonatal case files were retrieved from the medical records department. Thereafter, relevant information including maternal demographic and obstetric characteristics, labour and delivery record as well as maternal and neonatal outcome were retrieved using a data collection sheet. The results were analyzed using SPSS (IBM, USA) version 20.0. The study was conducted in accordance with institutional guideline on ethics and research and the data collected was used solely for the purpose of the research.

Results

During the period under review, there were 8,141 deliveries while 500 infants had macrosomia giving a prevalence of 6.1%; the retrieval rate for the study was 96% (480 out of 500 case files). The mean maternal age was 32.21±4.13years (range 17 - 40years), mean parity 3.0±2.0 and mean maternal weight at term 89.42±2.50kg. Also, 77(16.0%) were unbooked, 96(20%) were grand multipara, while 182(37.9%) had previous delivery of macrosomic babies. The commonest identified risk factors for fetal macrosomia was male fetal gender [422(87.9%)] as shown in table 1.

The commonest mode of delivery was spontaneous vertex delivery [314(65.4%)] while caesarean delivery rate was 29.8% (elective 11.9%, emergency 17.9%). The male infants were slightly bigger than the females (mean birth weight 4.30±0.08 vs. 4.05±0.07), babies delivered per abdomen were bigger than those delivered through the vaginal route (4.40±0.10 vs. 4.20±0.05) while perineal laceration was the commonest maternal complication occurring in 90 (18.8%) (Table 2).

In table 3, maternal booking status (p0.001), male fetal gender (p0.001) and birth weight less than 4500g (p0.002) were significant predictors of vaginal delivery among parturient with fetal macrosomia. Significantly more babies weighing 4000 to 4499g were delivered per vaginal while those weighing 5000g and above were delivered through the abdominal route (p0.002). Maternal complications were found to be significantly higher following vaginal delivery of macrosomic babies (p0.001). The neonatal mortality rate was 31/1000 deliveries (15/480) but there was no maternal death recorded among the study population.

Discussion

The prevalence of macrosomia in this study was higher than reports of 2.6 to 4.5% from older studies among Africans [1,2,] but similar to 8.1% from a recent study in Nigeria [8] but the incidence is 10-20% in Europe and North America [9]. This may be supportive of recent reports of the trend in African communities toward western diet, a relative improvement in social

Table 1: Maternal socio-demography and risk factors for fetal macrosomia

Parameter	Frequency	Percentage (%)
Maternal age (years)		
<35	345	71.9
=35	135	28.1
Mean age(years)	32.21±4.13	
Parity		
2 to 4	384	80.0
=5	96	20.0
Mean parity	2.84±1.93	
Mean maternal height (m)	1.58±0.70	
Mean weight at term (kg)	89.42±2.50	
Risk factors		
Postdated pregnancy	19	4.0
Obesity	22	4.6
Diabetes mellitus	36	7.5
Hypertension	41	8.5
Previous macrosomic baby	182	37.9
Male fetal gender	422	87.9

Table 2: Pregnancy outcome and complications

Parameter	Frequency	Percentage (%)
Mode of delivery		
Vaginal		
Spontaneous vertex delivery	314	65.4
Vacuum	19	4.0
Assisted breech	4	0.8
Caesarean		
Elective	57	11.9
Emergency	86	17.9
Fetal gender		
Female	58	12.1
Male	422	87.9
Mean birth weight		
Female	4.05±0.07	
Male	4.30±0.08	
Babies delivered per vaginam	4.20±0.05	
Babies delivered by caesarean delivery	4.40±0.10	
Low APGAR scores (=6)		
1st minute	43	9.0
5th minute	23	4.8
Maternal complications		
Cervical laceration	3	0.6
Shoulder dystocia	20	4.2
Vaginal laceration	27	5.6
Primary postpartum haemorrhage	82	17.1
Perineal laceration	90	18.8

Table 3: Modes of delivery and pregnancy outcome in women with fetal macrosomia

Parameter	Mode of delivery		χ^2	*p* value
	Abdominal	Vaginal		
Maternal Age				
<35	127	218	1.550	0.213
=35	58	77		
Booking status				
Booked	129	240	10.730	0.001
Unbooked	58	53		
Birth weight				
4.0-4.49	120	229		
4.5-4.99	57	54	31.144	0.002
=5.0	18	2		
Fetal gender				
Female	33	25	10.341	0.001
Male	148	274		
Maternal risk factors				
Postdatism	12	7		
Obesity	10	12		
Diabetes mellitus	20	16	1.325	0.857
Hypertension	22	19		
Previous macrosomic baby	99	83		
Low APGAR score (=6)				
1st minute	15	28	0.117	0.732
5th minute	9	14		
Maternal Complication				
Cervical laceration	0	3		
Shoulder dystocia	0	20		
Vaginal laceration	0	27	^{Y}69.755	<0.001
Perineal laceration	0	90		
Primary PPH	37	45		

χ^2: Chi square
Y: Yates corrected chi square

status and obesity with associated increasing mean birth weights and large for gestational age babies [10]. The rising maternal age at delivery in African communities and grandmultiparity (20% in this study) may also be relevant contributing factors [2]. However, the comparable recurrence rate of fetal macrosomia in this study (37.9%) and 39.5% from a similar study in Nigeria [8] suggest possible influence of environmental factors. A comparative study in Nigeria reported that fetal macrosomia is significantly associated with higher maternal age and parity, male fetal gender, birth asphyxia and caesarean delivery [8] which is comparable to the results in this study.

Male fetal gender preponderance among macrosomic babies in this study also corroborates a previous report from Nigeria [8]. The relatively higher birth weights of male babies have been attributed to a poorly defined influence of chromosome Y which establishes the antigenic dissimilarity that enhances trophoblastic invasion and its consequent promotion of fetal growth [11]. It also includes the speculation that the male fetus tend to have greater lean body mass and less body fat than the female probably due to the effect of fetal testosterone production [11].

Majority of macrosomic fetuses in this study were delivered per vaginam similar to other reports [8,10] but as the weight increased, there was a higher recourse to CS. This suggests that expectant management and attempt at vaginal delivery with recourse to abdominal delivery rather than elective abdominal delivery for all cases is a reasonable management option in fetal macrosomia [8]. This approach will no doubt reduce the increasing CS rate and its attendant risks in subsequent pregnancies and deliveries especially in low resource countries. Induction of labour (IOL) was theoretically considered as an option because it prevents ongoing fetal growth estimated at about 280g per week at term [8]. However, a systematic review and meta-analysis comparing expectant management and IOL concluded that IOL increased CS rate without improving perinatal outcomes [12]. Thus, in uncomplicated pregnancies, there is insufficient evidence for fetal macrosomia as an indication for IOL, however, elective CS has been suggested for weight >5000g in non-diabetics and 4500g in diabetes [3].

For an attempt at vaginal delivery of a macrosomic baby, an experienced obstetrician with skills in operative delivery and management of shoulder dystocia as well as a neonatologist should be in attendance. The risk for shoulder dystocia was observed to increase rapidly at birthweight above 400g while risk for third or fourth degree perineal lacerations did not change significantly [13]. This seem to suggest 4000g as the limit for safe vaginal delivery; however genital laceration remains a common maternal complication at vaginal delivery of macrosomic fetuses [6,8].

Studies have reported an association between fetal macrosomia and maternal obesity, higher BMI at the onset and increased weight gain during pregnancy. However, the early determination of BMI at onset or early in pregnancy is impracticable in most low resource countries due to the prevalent late or none antenatal booking status among parturient [1,2]. A population-based study in China reported that maternal overweight, increased weight gain in pregnancy and high fasting plasma glucose were associated with fetal macrosomia independent of maternal age and gestational age at delivery [14].

While the precise birth weight can only be confirmed at delivery, clinical and radiological (ultrasonography) methods used in predicting birth weight have been reported as imprecise in the third trimester [8]. The role of ultrasonography in predicting fetal macrosomia is further questioned because 2D machines have a low accuracy and high false positive rate; higher resolution (3D or 4D) machines are better [6] but not readily available in many low resource countries. In addition, clinical estimation is hindered by maternal, fetal and observer related factors. Therefore, the search for an ideal antenatal predictor of fetal weight remains elusive.

It has been suggested that primary prevention of fetal macrosomia could target nutritional control to modify the BMI, encourage physical activity and adequate attention to family and individual history of pre-gestational or gestational diabetes. During pregnancy, because the use of metformin has been associated with less gestational weight gain, its use has been suggested to prevent insulin resistance and fetal macrosomia. However, clinical trials involving women without diabetes but BMI >30kg/m^2 concluded that daily administration of metformin from 12th to 18th week till delivery did not reduce the median birth weight and incidence of LGA babies [15].

In conclusion, fetal macrosomia is prevalent in this study; while management should be individualized, this study suggest vaginal delivery when fetal weight is less than 4500g and abdominal delivery for 4500g or more. Also, vaginal delivery is associated with statistically higher maternal morbidity, therefore we recommend clinical and ultrasound estimation of fetal weight as a guide in determining the mode of delivery.

Disclosure

There was no conflict of interest in the conduct of the study.

References

1. Adetoro OO, Adedoyin MA. Maternal mortality and prenatal outcome for big babies. Trop J Obstet Gynaecol 1991:9(1):41-43.
2. Adesina OA, Olayemi O. Fetal macrosomia at the University College Hospital Ibadan: A 3-year reviews. J Obstet Gynaecol 2003:23(1):30-33.
3. American College of Obstetrician and Gynecologists. ACOG Practice bulletin clinical management guidelines for Obstetrician-Gynecologist. ACOG practice bulletin No 40, 2002. Obstet Gynecol 2002;100:1045-1050.
4. Jolly MC, Sebire NJ, Harris JP, Regan L, Robinson S. Risk factors for macrosomia and its clinical consequences: a study of 350,311 pregnancies. Eur J Obstet Gynecol Reprod Biol 2003;111:9e14.
5. Galvin DM, Burke N, Burke G, Breathnach F, McAuliffe F, Morrison J, et al. accuracy of prenatal detection of macrosomia >4000g and outcome in the absence of intervention: results of the prospective multicenter genesis study. Am J Obstet Gynecol 2017;216(Supp 1): S68.
6. Araujo EJ, Peixoto AB, Zamarian ACP, Elito JJ, Tonni G. Macrosomia. Best Pract Research Clin Obstet Gynaecol 2017;38:83-96.
7. Herbst MA. Treatment of suspected fetal macrosomia: a cost-effectiveness analysis. Am J Obstet Gynecol 2005;193:1035e9.
8. Ezegwui HU, Ikeako LC, Egbuji C. Fetal macrosomia: Obstetric outcome of 311 cases in UNTH, Enugu, Nigeria. Niger J Clin Pract 2011;14(3):322-6.
9. Cheng YK, Lao TT. Fetal and maternal complications in macrosomic pregnancies. Research Reports Neonatol 2014;4:65-70.
10. Onyiriuka AN. Trends in birthweights of babies born in Benin City, Nigeria. Ann Biomed Sci 2002;1(2):148-152.
11. Ounsted M, Ounsted C. The fetal growth rate. Clin Develop Med 1973;46:72-77.
12. Sanchez-Ramos L, Bernstein S, Kaunitz AM. Expectant management versus labour induction for suspected fetal macrosomia: a systematic review. Obstet Gynecol 2002;100:997-1002.
13. Froehlich R, Simhan H, Larkin J. An outcome-based approach to defining macrosomia. Am J Obstet Gynecol 2017;216(Supp 1): S77
14. Shi P, Yang W, Yu Q, Zhao Q, Li C, Ma X, et al. Overweight, Gestational Weight Gain and Elevated Fasting Plasma Glucose and Their Association with Macrosomia in Chinese Pregnant Women. Matern Child Health J 2014;18:10e5.
15. Chiswick C, Reynolds RM, Denison F, Drake AJ, Forbes S, Newby DE, et al. Effect of metformin on maternal and fetal outcomes in obese pregnant women (EMPOWaR): a randomised, double-blind, placebo-controlled trial. Lancet Diabetes Endocrinol 2015;3:778e86.