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OBSTETRICS

Fetal macrosomia at the University College Hospital, Ibadan: a 3-year review

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Summary

The study aimed to determine the maternal characteristics and contribution to obstetric morbidity of infants presenting with fetal macrosomia at the University College Hospital, Ibadan. This was a retrospective study. Obstetric data of the mothers were extracted from the casenotes and analysed. Fetal characteristics such as sex and weight, and perinatal complication were also analysed. The maternal characteristics that were significantly different in the study and control groups were parity, term weight ≥ 90 kg, previous history of fetal macrosomia and mean duration of pregnancy. There was no significant difference in maternal age or height. The incidence of caesarean section was three times more common in the study group. There were three cases of shoulder dystocia in the study group but none in the control group. The mean birth weight of macrosomic babies delivered by section or macrosomic babies that died was higher than the mean birth weight of macrosomic babies delivered per vagina or that survived. Severe asphyxia at 1 minute was significantly higher in the study group. Perinatal mortality among macrosomic babies was 11.4/1000. There was no mortality in the control group. It is suggested that clinical suspicion of macrosomic based on risk factors such as those identified in this study may be found useful in antenatal prediction.

Introduction

Fetal macrosomia has been defined by some investigators as a birth weight of 4 kg or above (Adetoro and Adedoyin, 1991; Abena Obama *et al*., 1995; Okun *et al*., 1997). Some authors, however, consider a fetus with birth weight 4.1 kg and above (Abudu and Awonuga, 1989; Fasuba *et al*., 1991) or 4.2 kg and above (Adinma and Agbai, 1995) as fetal macrosomia. Other studies, utilising population specific growth curves, categorise infants with a birth weight above the 90th percentile as large for gestational age (LGA) (Chervenak and Gabbe, 1991). For this study, the first definition was used.

Excessive fetal growth resulting in macrosomia has long been recognised as an important cause of perinatal morbidity and mortality, especially in the pregnancy complicated by diabetes mellitus (Chervenak and Gabbe, 1991). At delivery, the macrosomic fetus is more likely to suffer shoulder dystocia, traumatic injury and asphyxia (Abena Obama *et al*., 1995). The incidence of difficult vaginal delivery is more frequent with macrosomic fetuses. It is generally associated with a high incidence of abdominal delivery and increased overall hazard to mother and fetus (Boyd, 1983; Megafu and Ozumba, 1988). Some authors recommend routine caesarean delivery for the delivery of macrosomic fetuses (Berard *et al*., 1998). Thus, even in developing countries, all efforts should be made to confirm a diagnosis of fetal macrosomia before the onset of labour so that the mother can be assessed properly for the most appropriate method of delivery (Ogala and Audu, 1990).

The aims and objectives of this study were to: estimate the prevalence of macrosomia at the University College Hospital, Ibadan; determine the characteristics and possible predictive factors of the mothers of such infants; evaluate the contribution of macrosomia to obstetric morbidity such as operative delivery and complications of labour; and define fetal characteristics and neonatal complications.

Materials and methods

The study period was from 1 January 1998 to 31 December 2000. During the study period 3759 deliveries occurred. Any normal singleton baby delivered at term that weighed 4.0 kg or more was classed as macrosomic. Normal singleton babies who weighed between 3.0 kg and 3.5 kg and were delivered immediately after an index case served as the controls.

Obstetric data of the mothers of these babies such as age, height, parity, weight at term, duration of pregnancy, details of labour and complications was documented and analysed. Fetal sex and weight, Apgar score at birth, perinatal complications and fate of the baby was also analysed. Any mother whose parity was 5 and above was classified as a grand multipara. Labour lasting more than 12 hours is defined as prolonged labour.

Among the 130 study/control pairs, 84 casenotes (64.6%) of the macrosomic infants were available for analysis while 106 casenotes (81.5%) of the selected controls were available. Results were analysed by the simple χ^2 test for qualitative variables and the *t*-test for numerical variables. *P* values less than 0.05 were statistically significant.

Results

Out of the 3759 pregnancies delivered during the 3-year study period, 130 weighed 4.0 kg and above. The prevalence of macrosomia was thus 3.5%. Among the study group 15 (17.9%)were unbooked, compared with 12 (11.3%) of the control mothers.

Table I sets out the identified characteristics of the mothers in the two groups. Although the mean age of

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Table I. Maternal characteristics

	Macrosomia n = 84	*Controls n = 106*	*P value*
Age (years) mean, SD	30.5 ± 3.9	29.5 ± 3.2	> 0.05
Parity, mean, SD	1.82 ± 1.74	1.28 ± 1.77	< 0.05
Height (m) mean, SD	1.62 ± 0.05	1.62 ± 0.05	> 0.05
Weight at delivery (kg) mean, SD	84.6 ± 16.1	73.0 ± 11.1	< 0.05
Age			
= or > 35	18 (21.4%)	13 (12.3%)	< 0.05
< 35	66 (78.6%)	93 (87.7%)	
Grand multipara			
Yes	7 (8.3%)	2 (1.9%)	< 0.05
No	77 (91.7%)	104 (98.1%)	
Previous macrosomia			
Yes	25 (29.8%)	4 (3.8%)	< 0.05
No	59 (70.2%)	102 (96.2%)	
Term wt = or > 90 kg			
Yes	22 (26.2%)	12 (11.3%)	< 0.05
No	62 (73.8%)	94 (88.7%)	

Table II. Complications of pregnancy

	Macrosomia m = 84	*Control n = 106*	*P value*
Duration of pregnancy (day) mean, SD	281.6 ± 10.4	274.8 ± 11.5	< 0.05
Post dates	44 (52.4%)	35 (33.0%)	< 0.05
Hypertension	10 (11.9%)	2 (1.9%)	< 0.05
Diabetes mellitus	6 (7.1%)	0	< 0.05

30.5 years in the study group was not significantly higher than the mean age of 29.5 years in the control group, the mothers of macrosomic babies were more likely to be 35 years and above (21.4% of mothers in the macrosomic group, compared with 12.3% of controls). The difference was statistically significant. The mean parity was significantly higher in the macrosomic group than in the control group. In addition, the proportion of grandmultiparae in the study group was significantly higher (8.3% of mothers in the macrosomic group, compared with 1.9% of controls). Height did not appear to be a significant factor.

Pre-pregnancy maternal weight and weight gain during pregnancy could not be ascertained because most mothers booked in the second trimester. However, a weight of 90 kg or more at the end of pregnancy was found to be a significant risk factor, as was a previous history of macrosomia (29.8% of mothers in the macrosomic group, compared with 3.8% of controls).

Complications of pregnancy in the two groups are set out in Table II. The mean duration of pregnancy and proportion of patients with postdate pregnancy was significantly higher among the study group.

Table III shows that the cesarean section rate was more than three times higher in the macrosomic group than among the controls. The most common indications for abdominal deliveries in the study group were poor progress

Table III. Mode of delivery

	Macrosomic infants n = 84	*Control infants n = 106*
SVD	50 (58.5%)	92 (86.8%)
Emerg. CS	27 (32.1%)	10 (9.4%)
Elective CS	8 (9.5%)	4 (3.8%)

Table IV. Fetal characteristics and neonatal complications

Fetal characteristics and neonatal complications	*Macrosomia*	*Control*
Male	50 (59.5%)	51 (49.1%)
Female	34 (40.5%)	55 (50.9%)
Weight of macrosomic babies (kg, mean, SD)		
Males	4.16 ± 0.19	
Females	4.20 ± 0.22	
Mode of delivery of macrosomic babies by wt (kg, mean, SD)		
Caesarean section	4.21 ± 0.23	
Vaginal delivery	4.17 ± 0.11	
Mean birth weight of macrosomic babies that died (kg, means, SD)	4.5, 0.3	
Mean birth weight of macrosomic babies that survived (kg, means, SD)	4.1, 0.2	
Asphyxia at 1 minute, Apgar score = or < 6	23 (28.6%)	20 (19.0%)
Severe asphyxia at 5 minutes	8%	0 ($P < 0.05$)

in labour (17.6%) and cephalopelvic disproportion (26.5%) in contrast to breech presentation as the major reason for caesarean section in the control group (21.3%). There were three cases of shoulder dystocia in the study group. There were none in the control group. There was no maternal death in either group.

Table IV shows that 50 of the macrosomic infants were male. The male/female ratio observed in the macrosomic group was 1.47 : 1.0, while that observed in the control group was 0.96 : 1.0.

There was no perinatal mortality in the control group. The mean birth weight of macrosomic babies delivered by section or macrosomic babies that died was higher than the mean birth weight of macrosomic babies delivered vaginally or macrosomic babies that survived. Asphyxia at birth (Apgar score = or < 6 was more common in the study group. Severe asphyxia at 1 minute, score = or < 3 at 1 minute was significantly higher in the study group. The perinatal mortality among macrosomic babies is 71.4/1000. There was no perinatal mortality in the control group.

Discussion

The prevalence of macrosomia was found to be 3.5% in this study. Other authors reporting from other centres have quoted 2.9% at Ilorin (Adetoro and Adedoyin, 1991) 2.6% at Zaria (Ogala and Audu, 1990) and 0.95–10% in the Caucasian population (Boyd, 1983; Berard *et al.*, 1998). The prevalence of 4.5%, however, was found in Lagos

(Abudu and Awonuga, 1989). It is possible that these observed differences may be related to the differences in definition of macrosomia, race and social class of the study populations (Abudu and Awonuga, 1989).

There was a strong association between fetal macrosomia and maternal age of 35 years and above in this study. This is similar to the findings at Zaria (Ogala and Audu, 1990) and in Lagos (Abudu and Awonuga, 1989). However, height had no association with fetal macrosomia.

Parity was found to be associated strongly with fetal macrosomia, comparable to that reported by various authors (Abudu and Awonuga, 1989; Ogala and Abudu, 1990; Abena Obama *et al*., 1995), but contrary to the study of Mello *et al*. (1997). Our study demonstrated that women delivering macrosomic infants were more likely to have a previous history of delivery of a macrosomic infant, thus agreeing with the findings of Modanlou *et al*. (1980).

A larger percentage of the study group, compared with the control, were not booked into UCH. The University College Hospital, Ibadan receives mainly complicated cases from private and government hospitals in Ibadan and its environs. Konje *et al*. (1990) noted that the recent adverse economic situation in the country leads the patients to seek 'alternative' forms of obstetric care and thus to present only when complications arise.

A history of diabetes mellitus (gestational or pre-existing) occurred more commonly in the study group. Most workers have noted this increased association (Abudu and Awonuga, 1989; Pezzarossa *et al*., 1996; Mello *et al*., 1997). This finding may warrant routine screening for diabetes in mothers with risk factors for macrosomia.

There was a significant association between fetal macrosomia and term maternal weight of 90 kg and above. This is comparable to the findings of Abena Obama *et al*. (1995) in Cameroon. Other studies have demonstrated an association between fetal macrosomia and maternal obesity in pregnancy (Boyd, 1983), higher body mass index, (BMI) at beginning of pregnancy (Mello *et al*., 1997) and weight gain of more than 9 kg in pregnancy (Pezzarossa *et al*., 1996). Determination of BMI at onset of pregnancy or weight gain from the end of the 1st trimester is difficult to determine in our obstetric population because of late booking.

Macrosomic babies were born at later gestational ages in the study group. This is comparable to findings by Abudu and Awonuga (1989) and Caulfield *et al*. (1998). Postmaturity was also found to be a risk factor in fetal macrosomia.

The prevalence of caesarean section in the study group was 40.5%. However, they were essentially emergency sections performed mainly for fetopelvic disproportion and poor progress in labour. Babies delivered by caesarean section were heavier than those delivered vaginally. These findings may justify the high section rate in this study. Liberal use of caesarean delivery has been advocated as a mode of delivery for macrosomic babies (Berard *et al*., 1998). Other workers, however, failed to find a substantial decrease in fetal morbidity and mortality in macrosomic babies delivered by caesarean section to justify the high prevalence of caesarean sections, and therefore advocated earlier induction of labour at term in mothers of macrosomic babies (Boyd, 1983; Berard *et al*., 1998). Elective section in macrosomia advocated by some is, however, thought too radical by others, as fetal weight is not the only predictor of a difficult delivery (Abudu and Awonuga, 1989).

Severe asphyxia at 1 minute in the study group was significantly higher. This may be because sections in macrosomic babies are performed mainly as emergency procedures, often following failed attempted vaginal delivery. This may explain the failure to find a decrease in fetal asphyxia despite a high caesarean delivery rate (Boyd, 1983).

There was a preponderance of male babies in this study, as has been reported by other workers (Abudu and Awonuga, 1989; Abena Obama *et al*., 1995).

Ultrasonography seems the most reliable clinical option available for antenatal diagnosis (Chervenak and Gabbe, 1991). The value of symphysio-fundal height measurement of greater than 42 cm at term in predicting fetal macrosomia has been suggested. Ultrasound, however, is not readily available in many centres in developing countries. Hence it is suggested that in such situation, clinical suspicion of macrosomia based on risk factors such as those identified in this study with the use of symphysio-fundal height measurement may be found useful in predicting macrosomia in developing countries.

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