

Macrosomia: Prevalence and predisposing factors as seen at a university teaching hospital, South-South Nigeria

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Abstract

Background: The rising prevalence and the attendant morbidity and mortality arising from macrosomic births require a good understanding and good management protocol. **Objective:** To determine the prevalence and associated factors of macrosomia. **Design:** Retrospective study **Setting:** The labor ward, isolation ward and main theatre of the University of PortHarcourt Teaching Hospital (UPTH). **Subjects:** Four hundred and sixty babies with macrosomia delivered at UPTH. **Patients and Method:** Data including the birth weight, gestational age, sex, and mode of delivery, Apgar score, morbidity in the newborn, duration of admission, outcome of management, maternal age, parity, pregnancy and labor complications relating to the subjects were extracted and analyzed. **Results:** The prevalence of macrosomia was 7.4% (490/6642). It was highest in multiparous parturients (77.8%) (358/460) aged 30-34 years (42%) (193/460). Significantly more males 302(65.7%) (302/460) than females 158(34.3%) (158/460) were macrosomic $p < 0.001$. Ninety five (20.6%) (95/460) had moderate to severe birth asphyxia while 2% (9/460) were still births. Among the pregnancy and labor complications respectively noted in the parturients, gestational diabetes mellitus (18.2%) (28/154) and cephalopelvic disproportion (43%) were the most frequent. Majority, 299 (65.2%) (299/460) had spontaneous vertex delivery, while 150 (32.6%) (150/460) were delivered by Caesarean section. Birth asphyxia (20.6%) (95/460) and prematurity (8.5%) (39/460) were the leading fetal complications. **Conclusion:** Multiparous expectant women aged 30-34 years and those with gestational diabetes mellitus are prone to delivering macrosomic babies in this community. They should therefore be properly supervised with the fetus monitored for growth and size and appropriate mode of delivery and neonatal resuscitation determined prenatally to reduce the incidence of adverse perinatal outcome.

Key words: Macrosomia, Predisposing factors, Prevalence

INTRODUCTION

In the past, macrosomia was defined as birth weight of 4,500 grams and above.^[1] However, in recognition of the fact that the mean birth weight of Caucasians of 3,400grams is generally

higher than 2,900-3,000 grams which is the mean birth weight of newborns in developing countries, the definition of macrosomia has been modified by the World Health Organization in their Ninth International classification of Diseases and Deaths to include birth weights above 4,000 grams.^[2,3] Macrosomia is associated with high morbidity and mortality.^[4,5] Macrosomia may also be a component or associated presentation of certain syndromes in the newborn as seen in Beckwith Weidman syndrome, transposition of great arteries and others presenting with hyperinsulinaemia and hypoglycaemia in neonates such as nesidioblastosis, B- cell hyperplasia, B-cell adenoma, and gestational diabetes mellitus.^[4,6] Perinatal complications associated with macrosomia during delivery most often result from cephalo-pelvic disproportion leading to prolonged labor

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and difficult delivery, fetal distress, birth asphyxia, stillbirth, cephal-haematoma, birth injuries, subdural and intracranial hemorrhage.^[7-11]

Post-natally, hypoglycaemia is a frequent complication of macrosomia with usually fatal consequences, if not well managed.^[4]

Understanding the phenomenon of macrosomia and its complications becomes therefore a significant step in the efforts towards curbing the associated high perinatal and neonatal morbidity and mortality. Hence, there is a need for this study.

PATIENTS AND METHODS

This was a retrospective study conducted in the labor and isolation (unbooked) wards and the theatre of the University PortHarcourt Teaching Hospital, PortHarcourt from October 1st, 2008 to September 30th, 2011.

A list of all newborns with macrosomia (weight above 4,000 grams) and their mothers delivered in the different units was obtained from the respective delivery registers. Their folders were subsequently retrieved from the Medical Records department and data including the birth weight, gestational age, sex, mode of delivery, Apgar score, morbidity in the newborn, duration of admission, outcome of management; maternal age, parity, pregnancy and labor complications were extracted. Parity of the parturient used was the status just prior to the conception of the index macrosomic baby. Mothers that did not attend antenatal care in a hospital or clinic were regarded as unbooked. Macerated newborns and babies with congenital malformations incompatible with life were excluded from the study. Overall number of deliveries during the study period was derived from the delivery registers of the units.

The data were analyzed using EPI-info software version 6.04. $P < 0.05$ was regarded as statistically significant.

RESULTS

During the three-year study period, a total of 6,642 deliveries were recorded with 490 being macrosomic. Therefore the prevalence of macrosomia was 7.4% (490/6642). However, 30 cases were discarded for inadequate data; therefore 460 were used for further analysis. They comprised 302 males and 158 females, giving a male/female ratio of 1.9:1. The males were significantly more in number than the females. 302(65.7%) (302/460) vs. 158(34.3%) (158/460) $P < 0.001$.

The birth weights of the macrosomic babies ranged from 4,100 grams to 6,050 grams with a mean of 4,278 grams. The mean birth weight of the males was 4,315 grams whereas that of the females was 4,205 grams with no significant difference between them $P = 0.786$.

The mean maternal age of the macrosomic babies was 27.5 years, range 18 years to 42 years. The age brackets with highest

incidence of delivery of macrosomic babies were 30 -34 years (42.0%) (193/460) and 25-29 years (31.7%) (146/460). Other details are shown in Table 1.

Maternal parity and frequency of delivery of macrosomic babies: The frequency of delivery of macrosomic babies was highest in multiparous mothers, para 1, 2 (46.5%) (209/460) and 3, 4 (31.3%) (144/460) and lowest in nulliparous (17.4%) (80/460) and grand multiparous mothers (4.8%)(22/460) [Table 2].

Two percent (9/460) of the macrosomic babies were stillbirths while 20.6% (95/460) had moderate to severe birth asphyxia. Further details are shown in Table 3.

Pregnancy complications observed in the mothers of some macrosomic babies: Pregnancy complications were observed in 33.5% (154/460) of the parturients. Gestational diabetes mellitus (18.2%) (28/154) was the highest and Rhesus negative blood group (1.3%) (2/154) lowest in incidence [Table 4].

Cephalopelvic disproportion (43.0%)(52/121) was by far the most frequent labor complication followed by fetal distress (19.8%)(24/121) while retained placenta was the least frequent (0.8%) (1/121) [Table 5].

Mode of delivery of macrosomic babies was as follows: Spontaneous vertex delivery, 299 (65.0 %) (299/460);

Table 1: Age distribution of mothers of macrosomic babies

Age (years)	Frequency	%
<20	2	0.4
20-24	24	5.2
25-29	146	31.7
30-34	193	42.0
35-39	83	18.1
≥40	12	2.6

Table 2: Parity distribution of mothers just prior to delivery of subjects

Parity	Frequency	%
0	80	17.4
1,2	260	46.5
3,4	98	31.3
>4	22	4.8

Table 3: Obstetric characteristics of the macrosomic babies

Gestational	Frequency	%
Age (weeks)		
<37	39	8.5
37-41	398	86.5
≥42	23	5.0
Birth weight (Grams)		
>4000-4499	440	95.6
4500-4999	10	2.2
5000-5499	8	1.8
5500-5999	1	0.2
6000-6499	1	0.2
Apgar score		
0	9	2.0
1-3	25	5.4
4-6	70	15.2
≥7	356	77.4

Table 4: Pregnancy complications occurring in mothers of macrosomic babies

Pregnancy complications	Number	Percentage
Gestational	28	18.2
Diabètes mellitus		
Post date	23	14.9
PET	22	14.3
P.I.H	20	13.0
Transverse Lie	15	9.7
Breech présentation	14	9.2
Rétroviral infection	11	7.2
I.U.F.D.	9	5.8
APH	7	4.5
Fibroid	3	1.8
Rhésus –ve	2	1.3

PET - Pre-eclamptic toxæmia, P.I.H - Pregnancy induced hypertension, IUFD - Intrauterine foetal death, APH - Ante partum hemorrhage

Table 5: Labour complications in mothers of macrosomic babies

Labour complication	Frequency	Percentage
Cephalopelvic disproportion	52	43
Fetal distress	24	19.8
Delayed second stage	13	10.7
Poor progress	10	8.3
Primary tear	9	7.4
Postpartum hemorrhage	4	3.3
Shoulder dystocia	3	2.5
Intrapartum hypertension	2	1.7
Cord prolapse	2	1.7
Retained placenta	1	0.8
Face presentation	1	0.8

Caesarean section 150 (32.6%) (150/460); forceps 7(1.5%) (7/460); vacuum extraction 4 (0.9%) (4/460).

Fetal outcome observed in the macrosomic babies at birth was as follows: Normal, 291 (63.2%)(291/460); birth asphyxia, 95 (20.6%) (95/460); preterm, 39 (8.5%) (39/460); congenital anomalies, 15 (3.3%) (15/460); birth trauma, 11(2.4%) (11/460); stillbirths, 9(2.0%)(9/460). Among the cases of congenital malformations, 6 had omphalocele; 2, Beckwith Weidman syndrome; 2, transposition of great arteries and 5 unclassified. Cases of birth trauma observed comprised Erb's palsy, 6; fracture of clavicle, 3; dislocation of the shoulder joint, 2.

DISCUSSION

The prevalence of macrosomia of 7.4% observed in this study is lower than 8.1% reported from Benin, South-South Nigeria, in 2006,^[5] but clearly higher than the 1.68% reported from Ile Ife, south west Nigeria in 1991^[12] and 5.5% documented recently from Zaria, Northern Nigeria^[13] The higher prevalence reported from Benin-city could be explained at least partly, by the fact that the study included babies weighing 4000grams and above,^[5] whereas in the present study only babies weighing above 4000grams were taken as study subjects. In a recent prospective study from the same centre as that of the present survey, the incidence of macrosomia was 14.6%.^[4] However, only singleton deliveries were used

in the study and macrosomia was taken as birth weight 4000 grams and above.

In concordance with results of previous studies, significantly more males than females were macrosomic.^[12,13] Male babies being heavier than female counterparts has been attributed partly to the former having greater lean body mass and less body fat than the latter due to the effect of foetal testosterone production.^[14]

As observed in previous studies, the more-elderly parturients (30-34 years) have the highest incidence of delivery of macrosomic babies.^[12,13] Also, similar to previous documentations, the multiparous mothers were associated with the highest incidence of delivery of macrosomic babies viz a nulliparous parturients.^[4,5,13] Jackson had earlier noted that multiparous women tended to be heavier than the nulliparous at the start of pregnancy and are therefore more capable of supporting fetal growth from their endogenous reserves.^[15] Higher incidence of macrosomic baby delivery in older mothers could therefore be explained by the fact that the older mothers are generally more likely to be multiparous than their younger counterparts.

As in some earlier analyses, a high proportion of stillbirths and moderate to severe birth asphyxia (22.6%) was observed and most probably could have resulted from feto-pelvic disproportion and consequently difficult labor.

Gestational diabetes mellitus which is a well known predisposing factor to delivery of macrosomic babies was the most frequent pregnancy complication in parturients in this survey. Hyperglycaemia in the mother results in fetal hyperglycaemia and hyperinsulinaemia leading to increased glucose uptake by liver cells, glycogenesis, lipogenesis and increased protein synthesis resulting in increased body mass but not affecting the brain size.^[6]

In keeping with observations in earlier studies, cephalo-pelvic-disproportion (43%) and fetal distress (18.8%) were the most frequent labor complications occurring in the parturients.^[4,5,13] Fetal distress may result from difficult labor often arising from feto-pelvic disproportion.^[13]

High incidence of Caesarean section deliveries (32.6%) observed in this analysis as in previous studies could be explained by a high incidence of cephalo-pelvic-disproportion and fetal distress in labor.

Birth asphyxia commonly stated to be associated with delivery of macrosomic babies^[4,13] is also the most frequent fetal complication of the macrosomic babies documented in this analysis. Oruamabo noted that mature and large sized babies are more susceptible to developing birth asphyxia.^[16] Hypoglycaemia is a well known perinatal complication in macrosomic newborns,^[4] but this was not investigated in this study because this is a retrospective survey and documentations with regard to that were not seen on many subjects.

Limitations of the study include our inability to calculate the body mass index (BMI) of the mothers of the subjects, as this was a retrospective study and the parameters for its calculation were not recorded in all cases. The BMI is widely documented to bear a direct relationship to the size of the new born.

In conclusion, the prevalence of macrosomia is high and is particularly observed in conditions of maternal gestational diabetes mellitus and multiparous parturients aged 30-34 years. It therefore becomes mandatory that expectant women in these categories should have their fetus monitored for growth and size and appropriate mode of delivery and newborn resuscitation determined prenatally to minimize perinatal morbidity and wastage.

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