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ORIGINAL REPORT

Macrosomic Babies: An Audit of Five Years Admission Records at a Tertiary Health Centre in North-Eastern Nigeria

Authors: Pius.S.[1]*, Ibrahim. HA[1], Dada BJ[2], Bello .M[1]

[1]Department of Paediatrics, College of Medical Sciences, University of Maiduguri
[2]Department of Paediatrics, University of Maiduguri Teaching Hospital, Maiduguri

*Corresponding Author Email: simonpius2000@yahoo.co.uk, simonp@unimaid.edu.ng,
Tel: +2348036301749

Abstract

Introduction: Macrosomia is defined as birth weight of ≥4000 grams according to world health organization (WHO). The prevalence of macrosomia varies worldwide as it is said to be high in the developed countries of Europe and America and lower in Asia and African countries such as Nigeria.

Objective: The main objective of the study was to determine the prevalence of macrosomic babies at the University of Maiduguri Teaching Hospital, Maiduguri, Borno State, North-East sub-region.

Methods: This is a retrospective audit of all macrosomic babies (including inborn and out born) admitted in Special Care Baby Unit (SCBU) of the University of Maiduguri Teaching Hospital (UMTH) between 2010 and 2014.

Results: One hundred and thirty-two babies were macrosomic out of the 2800 admissions into the SCBU giving a prevalence of 4.7%. There were 70 (53.10%) males and 62 (46.9%) females with M: F of 1.2:1. Most of the babies (81.8%) were born to mothers between the ages of 30 to 35 years with weight ranges between 80 to 100 kilograms (kg). A total of 62.1% babies were delivered vaginally (SVD=53%, Forceps =2.3%, Vacuum=8%). Most of the babies weighed between 4000 and 5000 grams (70.5%). The common complications among the babies in this study were neonatal sepsis (22.0%), respiratory distress (15.9%) and asphyxia (12.9%). Other complications documented were hypoglycaemia and polycythaemia, (p-value=0.031). Birth trauma such as cephalhaematoma, Erb's palsy among others were few and insignificant.

Conclusion: The prevalence of macrosomia in this study was low compared to other reported prevalence in Nigeria. There is the need to conduct a prospective controlled study to further document details for informed pronouncement on the prevalence rate.

Keywords: Macrosomic babies, Prevalence, Complications, North Eastern Nigeria

Introduction

There is no standard or unified acceptable definition of macrosomia. However, experts in the field of perinatology/neonatology set criteria to define macrosomic newborn[1.] American College of Obstetrics and Gynaecology defined macrosomic neonate as newborn with birth

weight greater than or equal to (≥) 4000 grams or greater than 90th centile after correcting for sex and ethnicity. [1,2] Others have also used the birth weight
≥4.500grams. [2] The prevalence of macrosomia has worldwide variations with contrasting values from that of the United State of America (USA) and Europe [2], While it is said to be higher in the industrialized nations and among women of high socio-economic status. It is reported to be lower in developing countries with range 2.3-29.2% in one study.[3] Despite its contribution to morbidity and mortality, it has attracted less attention in the literature worldwide. [3] Reports from some African countries including Nigeria revealed a wide variation in prevalence, with a report of 2.3% from Tanzania [4], 3.4% from South Africa [5] and a prevalence of 3.5 to 9.1% from Nigeria.[6] It is also a known fact that several factors determine the prevalence of macrosomia which include race, genetics, fetal sex, duration of gestation, parity, maternal obesity and diabetes mellitus. Male newborns typically weigh more than female newborns and thus comprise a greater proportion of infants with birth weights exceeding 4,000 g at any gestational age. Even when controlled for diabetes, studies have demonstrated that Hispanic women have a higher risk of fetal macrosomia compared with white, African, or Asian women. [1,7] Macrosomia is responsible for higher rates of emergency or unplanned Cesarean deliveries and a high rate of admission into neonatal intensive care units (NICUs). [1, 3, 8]

Macrosomic births are associated with complications to both the mother and newborns. Maternal complications include increased risk of postpartum hemorrhage, prolonged labour, obstructed labour, uterine rupture, perineal lacerations and even foetal death while notable complications among macrosomic neonates include, fractures, nerve injuries, asphyxia, subdural haemorrhages and other associated co-morbidities like polycythaemia, metabolic derangement and congenital malformations among others. [9,10]

Prenatal determination of macrosomia, is often difficult due to unreliability of ultra-sonographic scan (USS) and also in obese mothers [11] Methods used for in-utero assessment of fetal weight include maternal risk profiles, abdominal examination and (USS) examination. [12] Most of the reported studies on macrosomic babies in these parts of the world are mainly on the predisposing/risk factors and outcome. There is paucity of reports on prevalence, morbidity, mortality as well as challenges in the management of macrosomic babies, especially in our settings. The aim of the study was to determine the prevalence of macrosomic neonates at Special Care Baby Unit (SCBU) of University of Maiduguri Teaching Hospital (UMTH), Maiduguri.

Materials and method:

This is a retrospective descriptive study of all macrosomic neonatal admissions. The study was a five-year review from January 2010 to December 2014 at the Special Care baby Unit (SCBU) of the Department of Paediatrics, University of Maiduguri Teaching Hospital (UMTH). Records of all neonates weighing greater than or equal to 4000 grams were retrieved from the medical record library and data extracted entered into the proforma. The information retrieved included; maternal age, maternal socio-demographic information, maternal history of diabetes mellitus, gestational age at delivery, place of antenatal care, parity, mode of delivery; birth weight, APGAR score, anthropometric measurements, complication associated with birth process. All data extracted were entered into SPSS IBM version 22. P-value of <0.05 was considered significant. Ethical clearance was obtained from UMTH ethics and research committee, while data confidentiality was maintained throughout the research in accordance with Helsinki declaration of 1948 as amended.

Results

A total of 2800 neonates were admitted during the study period. Of these, 132 neonates were macrosomic, giving a prevalence of 4.7%. There were 70 (53.0%) males and 62 (47.0%) females giving a M: F of 1.2:1. The weight range was between 4000 grams and 5800 grams with mean of 4450.5 ±0.270 grams and a mortality rate of 5.3% in this study.

Table 1 Shows the maternal socio-demographic characteristics. Most of the mothers (39.4%) fall within the age-range of 30 - 34 years. While 28.8 % were between 25-30 years and 18.2 % were ≥ 35 years old.

While 54.5 % had no formal education, others had primary education (10.6%), secondary education (11.4%) or tertiary education (23.5%). Majority (69.7 %) were not gainfully employed.

Table 2 shows maternal clinical characteristics; A total of 19 out of 132 (14.4%) mothers had gestational diabetes, 8.3% had diabetes mellitus, while 20.5% of the mothers had no known disease and may be referred to as constitutional macrosomic babies. Majority (53.8%) had spontaneous vaginal delivery, 6.8% of the mothers had vacuum delivery and forceps delivery was only recorded in 2.3 % of the population studied

Table 3 Shows; The neonatal clinical characteristics. Most (90.9 %) of the babies had birth weight between 4000 - 4900 g, 93 (70.5 %) had length within the range of 50 - 54 cm and (81.9 %) OFC of 33 - 36 cm. Sepsis, respiratory distress and asphyxia were the common morbidities observed in the babies with crude incidence of 22.0%, 15.9% and 12.9% respectively, while that of convulsion, cyanosis, cephalhaematoma and Erb's palsy were 6.1%, 3.8%, 2.3% and 1.5% respectively.

Table 1 Maternal Socio-demographic characteristics

Factors	Frequency	Percent
Maternal age (years)		
15 - 19	2	1.5
20 - 24	16	12.1
25 - 29	38	28.8
30 - 34	52	39.4
≤ 35	24	18.2
Maternal education		
No Formal Education	72	54.5
Primary Education	14	10.6
Secondary Education	15	11.4
Tertiary Education	31	23.5
Maternal occupation		
Not gainfully Employed	92	69.7
Self-employed	12	9.1
Middle cadre civil servant	28	21.2
Maternal weight (kilograms)		
65 - 79	12	9.1
80 - 89	52	39.4
90 - 99	59	44.7
≤ 100	9	6.8
Parity		
1 (Primipara)	29	22.0
2- 4 (multipara)	40	30.3
>4 (grandmultip)	63	47.7

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Table 2 Maternal Obstetrics/Gestational/Labour Characteristics

Factor	Frequency	Percent
Gestational diabetes		
Yes	19	14.4
No	113	85.6
Diabetic Mellitus		
Yes	11	8.3
No	121	91.7
Constitutional/familial		
Yes	27	20.5
No	105	79.5
SpontaneousVaginal delivery		
Yes	71	53.8
No	61	46.2
Forceps delivery		
Yes	3	2.3
No	129	97.7
Vacuum delivery		
Yes	9	6.8
No	123	93.2
Cesarean section		
Yes	49	80.3
No	12	19.7

Figure 1: Shows mean neonatal random blood sugar (RBS) in millimole/liter over 48 hour life after delivery for the three category of birth weight of babies. The baseline (0 hour) RBS for babies weighing 4000 - 4499 and 4500 - 4999 were 3.85 ± 1.28 and 3.71 ± 1.53 mmol/L respectively and they were comparable while that of babies weighing ≥ 5000 g was 2.72 mmol/L. which was significantly lower than values for babies of other categories of birth weight. The 48 hours RBS values after delivery, for babies weighing 4000 - 4499 and 4500 - 4999 relatively similar to the baseline RBS values, while that of the babies weighing ≥5000 increased significantly and was comparable in value with

Table 3 Neonatal Clinical Characteristics/Features

Factors	Frequency	Percent
Weight (g)		
4000 - 4499	81	61.4
4500 - 4999	39	29.5
≤5000	12	9.1
Length (cm)		
< 50	26	19.7
50 - 54	93	70.5
≤ 55	13	9.8
OFC (Head circumference)		
33 - 37	108	81.8
≤37	24	18.2
Asphyxia		
Yes	17	12.9
No	115	87.1
Cephalhaematoma		
Yes	3	2.3
No	129	97.7
Erb's palsy		
Yes	2	1.5
No	130	98.5
Respiratory distress		
Yes	21	15.9
No	111	84.1
Convulsion		
Yes	8	6.1
No	124	93.9
Cyanosis		
Yes	5	3.8
No	127	96.2
Sepsis		
Yes	29	22.0
No	103	78.0

value of RBS for babies with other categories of birth weight.

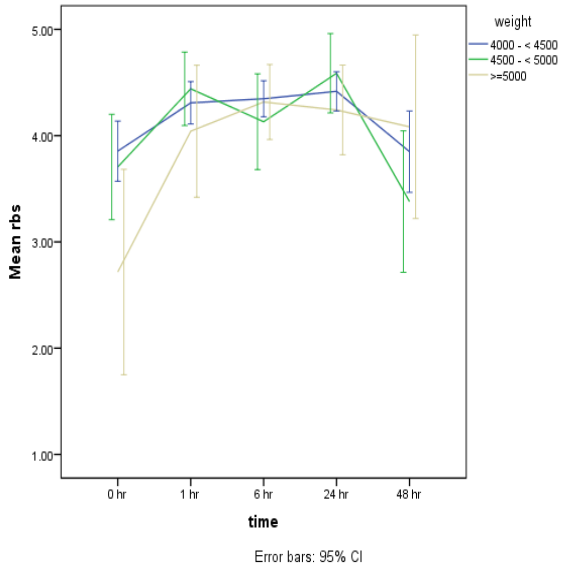


Figure 1: Mean Neonatal RBS across 48 hours of life post delivery

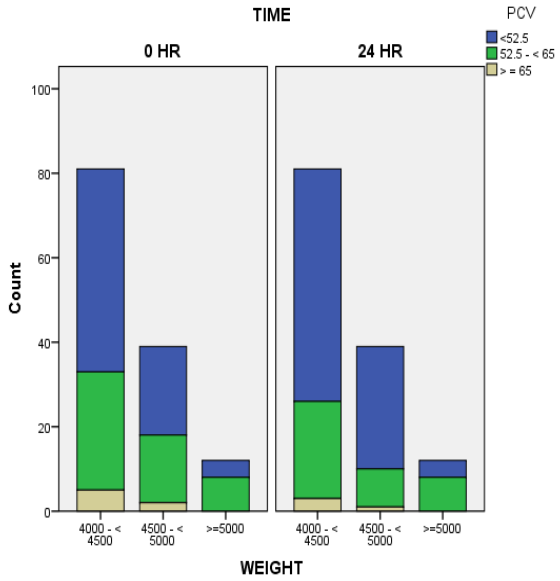
Table 4 Mean Neonatal RBS over 48 hours of life after delivery

Time (hr)	RBS (Mean ±SEM) of different weight range			
	4000–4499 g	4500- 4999 g	≥ 5000 g	*P. value
0	3.85 ±1.28	3.71 ±1.53	2.72±1.53	0.031
48	3.85 ±1.73	3.38 ±2.05	4.08±1.35	0.322

*SEM=standard error of mean *Fitsher's exact test

Discussion The prevalence of macrosomia in this study was 4.7%, this value is significantly low compared to other studies such as Iyoke *et al* [6] who reported a prevalence of (9.3%) from multi-centre reviews from South-Eastern Nigeria, Onyiruka *et al* [9], a prevalence of (8.1%) from Benin South-south Nigeria and Akindele *et al* [13] with a reported prevalence of (7.8%) from Abuja North-central and the federal capital territory.

Figure 2: Distribution of neonatal PCV by weight class compared at time 0 hour and 24 hour



The prevalence in this study was also lower than the prevalence of (7.4%), reported by Onyearugha *et al* [14] from Port Harcourt, South-South Nigeria. The North-East, especially Borno State has suffered displacement of persons with majority of its population outside the state capital as internally displaced persons with no means of livelihood due to ongoing insurgency for over a decade. This may have contributed to lower prevalence of macrosomic births in this study, other reasons may be poor socioeconomic status, small sample size and peculiarity of the people of the Savannah region especially with respect to their dietary practices. Similar reasons for the variations have been pointed out by Olokor *et al.* [1] Unlike the study centre, most studies from other centres mentioned above who reported high prevalence of neonatal macrosomia were predominantly from high socio-economic parts of the country. However, the prevalence (4.7%) reported in this study was higher than the 2.1% reported by

Onankpa *et al* [15] from Sokoto, North-western Nigeria and 2.5% reported by Ezegwui *et al* [11] from Enugu South-eastern Nigeria. Our prevalence was also high compared to the prevalence of 2.5% reported by Kamanu *et al* [10] in Aba Eastern Nigeria and 2.9% reported by Mutihir *et al* from Jos North-central Nigeria. A similar lower prevalence was also reported by Said *et al* [4] from Tanzania. We speculate that this might.be due to variation in the study design, sample size and concepts of the evaluation of macrosomic babies which depended also on the locations and reasons for the research.

The occurrence of macrosomic births was more among mothers with higher weight than those with lower weight in pregnancy. Also, there were more macrosomic births from grand multiparous mothers than those with lower parity. This report was similar to the works by Iyoke *et al.* [6] However, it was in contrast to the study by Said *et al* [4] from Tanzania. In this study also, instrumental and/or operative deliveries accounted for 46.2% which was higher than 27.3%, 32.6% and 41.2% from Enugu [11], Port Harcourt [14] and Benin [16], respectively, but was lower than the 55.9% reported by Kayode-Adedeji *et al* [3] and Najafian *et al* [17] from Iran. We speculated that the wide differences in these operative deliveries may have resulted from the differences in local definition of macrosomic babies and the expertise of the managing Obstetrician as to which delivery progresses spontaneously without intervention or otherwise.
We reported a higher prevalence of male macrosomic babies compared to the female babies and this has been corroborated by other studies [6, 14, 18], within Nigeria. This is however in contrast with that documented by Iyoke *et al* [4] from Enugu who reported no gender difference. The male preponderance is most likely due to genetic factors. Large proportion of the macrosomic babies had birth weight between 4000 grams to 4500 grams and the mean weight was 4450.5 grams; this is similar to the observation made by *Kayode-Adedeji et al* [3] from Benin and Osaikhuwuomwan *et al* [16] from Port Harcourt.
The complications associated with macrosomia identified in this study were perinatal asphyxia (12.9%), respiratory distress (15.9%) and sepsis (22.0%), these were higher than the report by Kayode-Adedeji *et al* [3] although only a small proportion of neonates had polycythaemia (2.7%). Types of birth trauma identified in this study are; Erb's palsy (1.5%) and cephalhaematoma (2.3%). In this study hypoglycaemia and polycythaemia were observed among the babies on admission in those weighing greater than 5000 grams, although this was not statistically significant. The mortality in this study was 5.3%, and this is lower than the report from Irrua Southern Nigeria [3] but was similar to those reported by Akindele *et al* [13].

Conclusion

Overall, the prevalence of macrosomia in this study was high though comparatively lower than most reports even within the same country. Also, maternal risk factors as well as neonatal morbidities and outcome were similar to those of other reports within Nigeria and other African countries. To make plausible statement, a prospective case control study should be undertaken in the future where factors will be controlled in the study so as to come with more comprehensive results and outcome.

Limitation

This is a retrospective study of macrosomic babies of both inborn and out born referred to special care baby unit (SCBU) of the centre for management. Some of the data from records were incomplete or missing and were not comprehensive enough to represent the entire population of macrosomic babies.

Conflict of Interest: None declared
Sponsorship: None declared

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