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■ Original Research Article

Foetal Macrosomia: A 5-Year Review of the Prevalence, Risk Factors and Foeto-Maternal Outcomes at Federal Medical Centre (FMC), Abeokuta, Nigeria.

Omotola Aminat Oladosu-Aderolu[1], Joshua Ebuka Ifebude[2], Rukayat Abiodun Olayemi[3], Oluwasegun Caleb Idowu[4], Olukayode Olumide Taiwo[5].

[1]Department of Obstetrics and Gynaecology, Federal Medical Centre, Abeokuta. [2]Department of Obstetrics and Gynaecology, University College Hospital, Ibadan. [3]Department of Clinical services, Crescent University, Abeokuta, Ogun state. [4]Department of Obstetrics and Gynecology, University College Hospital/University of Ibadan, Ibadan. [5]Department of Obstetrics and Gynaecology, Federal Medical Centre, Abeokuta.

Abstract

BACKGROUND: Fetal macrosomia is a condition associated with an increased risk of poor fetal and maternal outcomes. Therefore, a good understanding of the condition is necessary to improve fetomaternal status at delivery and puerperium. **AIM:** This study was designed to determine the prevalence, risk factors, and feto-maternal outcomes in pregnancies that ended with the delivery of macrosomic neonates. **MATERIALS AND METHODS:** The study was a retrospective observational study conducted at the Federal Medical Centre, Abeokuta, (FMCA). All case notes of the postpartum women delivered during the study period from the 1st of January, 2017 to the 31st of December, 2021 were retrieved and reviewed. The age, booking status, parity, maternal body mass index, presence of co-morbidities, gestational age at delivery, mode of delivery, and complications at delivery were extracted and entered into a proforma. The birth weight, gender, Apgar score, neonatal admission, and morbidity were also recorded. The data were analyzed using the statistical package for the social sciences (SPSS 22 for Windows). **RESULTS:** The total number of deliveries during the period of study was 4920; of these, 124 deliveries resulted in macrosomic babies. Thus, the prevalence of fetal macrosomia was 2.5%. Fetal macrosomia was highest in multiparous parturient n=104 (88%). The commonest maternal age group was 30-34 years n=41 (35%). It was more prevalent in male fetuses n=62 (53%) than in female fetuses n=56 (47%). The common factors identified were maternal obesity at term n=82 (70%), post-datism n=61 (52%), pre-gestational diabetes mellitus n=6 (5%), gestational diabetes mellitus n=3 (2.5%), and previous history of fetal macrosomia n=3 (2.5%). The commonest maternal complication was postpartum hemorrhage n=5 (4.2%). The rate of cesarean section among women delivering macrosomic babies was n=82 (69.5%). The APGAR score at the fifth minute was less than 7 in 3 neonates (2.5%). There was one (0.8%) stillbirth, and two neonates had congenital anomalies (0.8%). The common reasons for neonatal admission were respiratory distress (18%), neonatal jaundice (13%), and presumed sepsis (8.4%). **CONCLUSION:** This study reveals that the commonest risks for fetal macrosomia are maternal obesity and postdatism. These require action, as they are modifiable factors that can be mitigated by counseling women about healthy living and prevention of prolonged pregnancy by induction of labor. However, despite the associated fetal and maternal complications, the feto-maternal outcome is good if managed appropriately.

Correspondence:

Joshua Ebuka Ifebude
Department of Obstetrics and Gynecology,
University College hospital, Ibadan.
+2348160882757
joshuaifebude@gmail.com

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INTRODUCTION

Macrosomia refers to excessive birth weight irrespective of the gender and gestational age at delivery. It is an Obstetric condition associated with maternal and perinatal morbidity. There are considerable variations in the minimum weight used to define macrosomia. According to the American College of Obstetrics and Gynecology (ACOG), this condition contrasts with "large for gestational age" (LGA), which considers birth weight relative to gestational age, specifically at or above the 90th percentile.[1,2] Historically, birth weights of 4,000 g or 4,500 g have been used to classify macrosomia, though no universal definition has been accepted. In our environment, a cut-off of 4000g is most commonly used.[3] Ethnicity, gestational diabetes, prolonged pregnancy, high parity, male gender, and obesity have been suggested to play a role in determining fetal weight.[4,5] Therefore, the prevalence of fetal macrosomia varies from region to region. Globally, macrosomia affects 6-10% of newborns.[6]

Macrosomia is one extreme of fetal growth abnormality that significantly contributes to poor pregnancy outcomes. It poses a significant risk of adverse pregnancy outcomes in the third trimester of pregnancy. It is associated with an increased risk of stillbirth and birth injuries: including shoulder dystocia, brachial plexus injury, and limb fracture; as well as increased rates of operative delivery and perineal trauma.[7] Postnatally, macrosomic infants have higher rates of admission to the neonatal unit and are more likely to develop hypoglycemia and hyperbilirubinemia.[5,8,9] Macrosomic infants have increased rates of diabetes, metabolic syndrome, and cardiovascular diseases later in childhood and adult life.[10] Across the world, changes in lifestyle and diet are contributing significantly to increased rates of gestational diabetes and hyperglycemia in pregnancy, and we face a global epidemic of macrosomia and its sequelae.[11]

In contrast with Intrauterine growth restriction (IUGR), macrosomia is poorly defined and understood in developing countries like Nigeria. Our literature search revealed that there are few studies assessing the peculiar risk factors for fetal macrosomia in our environment. Understanding the risk factors and the foeto-maternal outcome is key in management to improve the prognosis. Therefore, this study aimed to determine the prevalence and risk factors of fetal macrosomia; as well as macrosomia-associated maternal and neonatal morbidity during the study period at FMC, Abeokuta.

MATERIALS AND METHOD

The study was a descriptive retrospective study conducted using the medical records of women with neonates weighing 4kg and above at the Federal Medical Centre, Abeokuta, (FMCA). The post-natal ward records were reviewed to determine the number of macrosomic babies delivered between the 1st of January, 2017, and the 31st of December, 2021. The total number of retrieved case files was 118 out of the 124 births noted from the labor ward delivery register; giving a retrieval rate of 95%.

The case files of women who delivered macrosomic fetuses were retrieved from the medical records, and relevant data: including demographics of the mother: such as age, booking status, parity, occupation, weight, and height, were extracted. The risk factors for macrosomia: like maternal obesity, diabetes in pregnancy, previous history of fetal macrosomia, post-datism, and fetal gender, were also recorded. The assessed maternal outcomes include: the mode of delivery, blood loss at delivery, need for blood transfusion, shoulder dystocia, and genital tract trauma. The information for the neonates was retrieved from the neonatal unit medical records: including the Apgar score at 1st and 5th minutes, birth trauma, neonatal morbidities, and neonatal admission. Only the data from the retrieved case files were analyzed. The statistical package for the social sciences (SPSS 22 for Windows) was used for data recording and statistical analyses. The descriptive analyses used included the mean, mode, standard deviation, and frequency distribution. Ethical approval for this study was obtained from the Ethical Committee of the Federal Medical Centre, Abeokuta.

RESULTS

The total number of deliveries during the study period was 4920. Of these, 124 deliveries resulted in macrosomic babies. Thus, the prevalence of fetal macrosomia was 2.5%. As shown in Table 1, the mean maternal age was 32.4 ± 5.08 years (range 24-47 years). Most women in the study were multiparous n=83 (70.3%), 31 (26.3%) were primiparous, and 4 (3.4%) were grand-multiparous. One hundred and four of the women (83.9%) were booked. The factors identified with fetal macrosomia include maternal body mass index greater than 30kg/m^2 at term n=82, (70.0%), post-datism n=62, (52.5%), pre-gestational diabetes mellitus n=6, (5.0%), gestational diabetes mellitus n=3, (2.5%) and a previous history of fetal macrosomia n=3, (2.5%). Male babies constituted 52.5% of macrosomic babies born during the 5 years. Figure 1 reveals that ninety-five babies (80.6%) weighed between 4000g and 4449g, 18 (15.3%) of the babies weighed between 4450g and

4999g, and only 5 babies weighed above 5000g. The mean birth weight was 4.196g±180g (range, 4000g-5400g). The mean gestational age at delivery was 39.5±1.2 weeks. Fifty-six babies (47.5%) were delivered between the 37th and 39th gestational weeks; while 62 babies (52.5%) were at 40 weeks and above.

Table 1: Maternal Parameters

Age (years)	**Number of parturients (118)**	**Percentage (%)**
20- 29	34	28.8
30-39	73	61.9
≥40	11	9.3
Parity		
1	31	26.3
2-4	83	70.3
≥ 5	4	3.4
BMI(Kg/m^2)		
<25	9	7.6
25-29.9	22	18.6
30-39.9	78	64.1
40 and above	9	9.7
G.A(completed weeks)	**Number (118)**	**Percentages**
Less than 37wks	8	6.8
37-40wks	40	40.7
>40wks	62	52.5
Mode of delivery		
SVD	25	21.2
Vacuum-Assisted	11	9.3
Caeserean Section	82	69.5
Blood Loss(ml)		
< 500	42	35.5
500- 999	65	55.1
>1000	11	9.4

Table 1 also shows that the route of delivery was Cesarean section (CS) in 82 patients (69.5%) of the mothers, 25 patients (21.2%) had spontaneous vaginal delivery, and 11 patients (9.3%) were delivered by vacuum extraction. The major maternal complication recorded was postpartum hemorrhage seen in 5 (4.2%), and 2 of the 5 patients required blood transfusion. The average blood loss at delivery was 280ml with a range of 50-1500ml. There was no genital tract laceration and no documented case of shoulder dystocia.

Table 2: The distribution for APGAR score at 1 and 5 Minutes

APGAR Score (1min)	Number of neonates	Percentage
≥ 7	106	90
4-6	11	9.3
0-3	1	0.7
APGAR Score (5 mins)		
≥7	109	92.4
4-6	8	6.9
0-3	1	0.7

As shown in Table 2; eight (6.9%) babies were moderately asphyxiated; while one baby (0.7%) had severe perinatal asphyxia. The only birth trauma recorded was a case of gluteal laceration during cesarean breech delivery. Fifty-five babies (44.4%) were admitted to the neonatal unit. Eight of these were due to respiratory distress, 8 for neonatal jaundice, 7 for perinatal asphyxia, 6 for presumed sepsis. The majority (20.9%) of babies were admitted for observation due to fetal macrosomia or infants of diabetic mothers.

The gestational age at delivery, mode of delivery, and estimated blood loss at delivery among the parturients is presented in table 1.

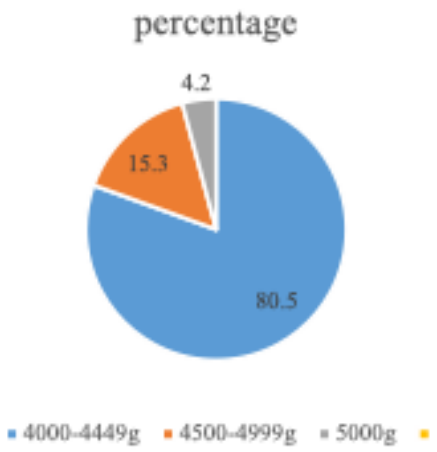

Figure 1: The birth weight Distribution of the babies

The Birth Weight Distribution of the Babies

Fig 1 is a pie chart showing that 95 (80.5%) of the babies weighed between 4000g and 4449g. About 18 (15.3%) of the babies weighed between 4500-4999g, and only 5 babies weighed above 5000g. The mean birth weight was 4.196 and the standard deviation was 180g.

The Distribution for APGAR Score at 1 And 5 Minutes

Table 2 shows the APGAR score at one minute and five minutes. For the APGAR score at one minute, a normal APGAR score was recorded in 106 (90%) of the babies, an APGAR score of 4-5 was recorded in 11 (9.3%) and an APGAR score of 0-3 was recorded in 1 baby (0.7%). At five minutes, 109 (92.4%) had normal APGAR scores, while 8 (6.9%) of the babies had an APGAR score of 4-6. One of the babies was delivered as a fresh stillborn.

DISCUSSION

The prevalence of fetal macrosomia in this study was 2.5%. This finding is consistent with previous studies in Ebonyi State and Edo in Nigeria, which reported a prevalence of 6.5% and 8% respectively.[3,12] Other African countries such as Tanzania and Ethiopia reported a prevalence of 2.3% and 7.5% respectively.[13,14] While the prevalence of 10.9% in Algeria, 11.8%, and 8.1% in Tunisia was obtained by Mai A and Mallouli et al respectively .[15,16] Significantly higher values were obtained in other continents such as Mexico 18.65%, Iran 11.8%, USA 7.6% and Lithuania 24.4%.[17–19] This variation may be due to differences in the socio-demographic characteristics of the women studied, the study design, and ethnic differences. Higher values from developed countries are probably due to the increased prevalence of diabetes and obesity in their population. Genetic factors may also be contributory.

Seventy-one percent of the mothers who delivered macrosomic babies were above 30 years. This finding was similar to that observed in a study done in Tanzania.[13] This may be because increasing maternal age may affect maternal metabolism; thereby increasing the growth velocity in the fetus. Obesity and type 2 diabetes also increase with increasing age.

The gestational age at delivery of 40 weeks and above (53.5%) was reported to be higher in women with fetal macrosomia. Similar values of 65.4% and 44% were reported in previous studies done in Nigeria.[13,20] Fetal growth velocity is maximum (26.9 g/day) between the 32nd and 36th weeks of pregnancy. It declines gradually to 24 g/day over the 36th week of pregnancy. Therefore, the longer the fetus stays in-utero, the higher the birth weight. Prolongation of pregnancy could also increase the exposure of the fetus to higher levels of glucose, insulin, and different metabolic alterations if diabetes or obesity is present.[13]

There was a high male-to-female ratio among macrosomic babies in this study. Similar findings were reported from studies done in Nigeria.[3,12] Maternal glucose tolerance status was a significant predictor of fetal macrosomia in male but not in female neonates in a previous study.[21] This may be explained by sexual dimorphism for insulin sensitivity, growth hormone, insulin growth factor 1 axis, and cytokines.[21]

Diabetes in pregnancy was found in 7.5% of mothers who delivered macrosomic babies, which is similar to the 6% reported in a study done in Abakaliki, Nigeria.[3] Significantly higher values of 37.4% and 25.6% were reported from other studies.[21,22] This may be due to the lower incidence of diabetes in this environment.

A previous history of macrosomia was also identified in women who delivered macrosomic fetuses in this study. Recurrence of fetal macrosomia may be due to greater maternal BMI at the time of conception, and excessive weight gain between and during pregnancy.[23]

Regarding maternal outcomes, the overall cesarean section (CS) rate in this study was 69.5% (n =82), out of which 34% (n = 40) of cases were due to suspected macrosomia. Lower rates of 22.8% and 18.5% were reported in other studies.[3,24] A study in China however reported a rate of 40.9%.[25] The high rate of CS observed in this study is mainly due to the elective delivery of macrosomic babies via CS; rather than by induction of labor. Feto-pelvic disproportion and other abnormalities of labor were cited as indications for cesarean section in another study.[25] Maternal complications encountered include perineal tear (7 cases, 1.7%), PPH (5 cases, 1.2%), and cervical lacerations (3 cases, 0.7%), all the complications were effectively managed. Maternal complications related to macrosomia may arise after emergency CS, as macrosomia is most often diagnosed during abnormal labor when the fetal head is deeply engaged. Primary postpartum hemorrhage complicating macrosomia is often associated with uterine atony and genital lacerations. No maternal deaths occurred in this study due to prompt and effective management of complications using our departmental protocol.

The neonatal outcome was good in this study, as only 6.9% of the babies were moderately asphyxiated, while 0.7% had severe perinatal asphyxia. One of the most dreaded complications of vaginal delivery in macrosomic babies is shoulder dystocia. In this study, there was no documented case of shoulder dystocia or brachial plexus injury. This may be due to the high rate of cesarean section in this study since CS eliminates the risk of shoulder dystocia.[26] To decrease the incidence of shoulder dystocia related to macrosomia, it is important to improve the accuracy of fetal weight estimation. Macrosomic fetuses can be diagnosed antenatally and delivered through an elective CS. The only birth injury recorded was a case of gluteal laceration during a cesarean breech delivery. Fifty-five (55) babies were admitted to the neonatal unit. Eight (8) of these were due to respiratory distress, 8 for neonatal jaundice, 7 for perinatal asphyxia, and 6 for presumed sepsis. However, most of the macrosomic neonates admitted were only

observed due to their macrosomic status and being infants of diabetic mothers; but had no symptoms at delivery.

Strength and Limitation

The strength of the study includes a high records retrieval rate, analysis of both maternal and fetal outcomes, and a sample representative of the population analyzed, as the hospital is the foremost referral Centre in the state. The limitations of this study are its retrospective nature and the lack of a control group. Although FMC Abeokuta is a referral center, a multi-center study will be more representative of the general population.

CONCLUSION

Despite the adverse maternal and perinatal outcomes associated with fetal macrosomia, it is obvious from this study that when managed anticipatorily either with elective cesarean section or a low threshold for elective cesarean section, the outcome is favorable. However, the number of caesarean sections needed to prevent each adverse outcome is uncertain from this study. More studies would be needed to answer this question.

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REFERENCES

1. Gynecology: Macrosomia: ACOG Practice Bulletin Summary,... - Google Scholar [Internet]. ACOG. 2022 [cited 2025 May 22]. Available from: https://scholar.google.com/scholar?q=related:5zCOOucSPB0J:scholar.google.com/&scioq=Macrosomia:+ACOG+Practice+Bulletin+Summary,+Number+216.+Obstet+Gynecol.+2020+Jan%3B135(1):246-248&hl=en&as_sdt=0,5#d=gs_cit&t=1747903380060&u=%2Fscholar%3Fq%3Dinfo%3A5zCOO
2. Boulvain M, Thornton JG. Induction of labour at or near term for suspected fetal macrosomia. Cochrane Database Syst Rev. 2023;2023(3).
3. Daniyan O, Ezeanosike O, Obu D, Onwe O, Asiegbu U, Joe-Akunne C. Prevalence of Macrosomia and Associated Complications As Seen in a Neonatal Unit of a Tertiary Hospital in South Eastern Nigeria. Yenagoa Med J. 2021;3(3):187–91.
4. Nguyen MT, Ouzounian JG. Evaluation and Management of Fetal Macrosomia. Obstet Gynecol Clin North Am. 2021;48(2):387–99.
5. Moodley T, Moodley J. A retrospective identification of risk factors associated with fetal macrosomia. Afr J Reprod Health. 2022;26(7):127–34.
6. Usta A, Usta CS, Yildiz A, Ozcaglayan R, Dalkiran E Sen, Savkli A, et al. Frequency of fetal macrosomia and the associated risk factors in pregnancies without gestational diabetes mellitus. Pan Afr Med J. 2017;26(62):1–8.
7. Bulletin P. Fetal Macrosomia. Obstet Gynecol. 2016;128 (5):1191–2.
8. Beta J, Khan N, Khalil A, Fiolna M, Ramadan G, Akolekar R. Maternal and neonatal complications of fetal macrosomia: systematic review and meta-analysis. Ultrasound Obstet Gynecol. 2019;54(3):308–18.
9. Elie N. Maternal and neonatal complications of macrosomia. Trop Doct. 2014;44(4):201–4.
10. Barker DJP. In utero programming of chronic disease. Clin Sci. 1998;95(2):115–28.
11. Mitchell S, Shaw D. The worldwide epidemic of female obesity. Best Pract Res Clin Obstet Gynaecol [Internet]. 2014;29(3):289–99. Available from: http://dx.doi.org/10.1016/j.bpobgyn.2014.10.002
12. Kayode-Adedeji B, Egharevba O, Omoregbee H. Prevalence of fetal macrosomia and neonatal complications in a Nigerian suburban hospital: a five year study. J Pediatr Neonatal Individ Med. 2018;7(1):1–5.
13. Said AS, Manji KP. Risk factors and outcomes of fetal macrosomia in a tertiary centre in Tanzania: A case-control study. BMC Pregnancy Childbirth [Internet]. 2016;16(1):1–8. Available from: http://dx.doi.org/10.1186/s12884-016-1044-3
14. Adugna DG, Enyew EF, Jemberie MT. Prevalence and Associated Factors of Macrosomia Among Newborns Delivered in University of Gondar Comprehensive Specialized Hospital, Gondar, Ethiopia: An Institution-Based Cross-Sectional Study. Pediatr Heal Med Ther. 2020;11:495–503.
15. Mai A, Abbassia D. The Prevalence of Fetal Macrosomia at the Specialized Hospital of Gynecology and Obstetrics of Sidi Bel Abbes (West Of Algeria). J Nutr Food Sci. 2014;04(02):3–7.
16. Mallouli M, Derbel M, Ingrid A, Sahli J, Zedini C, Ajmi T, et al. Associated outcomes to fetal macrosomia: Effect of maternal diabetes. Tunisie Medicale [Internet]. 2017 [cited 2024 May 19];95(2):120–5. Available from: https://www.researchgate.net/publication/321667953_Associated_outcomes_to_fetal_macrosomia_Effect_of_maternal_diabetes
17. García-De la Torre JI, Rodríguez-Valdez A, Delgado-Rosas A. Risk factors for fetal macrosomia in patients without gestational diabetes mellitus. Ginecol Obstet Mex [Internet]. 2016;84(3):164–71. Available from: http://www.ncbi.nlm.nih.gov/pubmed/27424442
18. Salihu HM, Dongarwar D, King LM, Yusuf KK, Ibrahimi S, Salinas-Miranda AA. Trends in the incidence of fetal macrosomia and its phenotypes in the United States, 1971–2017. Arch Gynecol Obstet. 2020;301(2):415–26.
19. Mardani M, Khalkhalirad A, Rossta S, Rezapour P. Evaluation of the prevalence of macrosomia and the maternal risk factors. Iran J Neonatol. 2014;5(3):5–9.
20. Cheng YW, Nicholson JM, Nakagawa S, Bruckner TA, Washington AE, Caughey AB. Perinatal outcomes in low-risk term pregnancies: do they differ by week of gestation? Am J Obstet Gynecol. 2008;199(4):370.e1-370.e7.
21. Ricart W, López J, Mozas J, Pericot A, Sancho MA, González N, et al. Maternal glucose tolerance status influences the risk

of macrosomia in male but not in female fetuses. J Epidemiol Community Health. 2009;63(1):64–8.
22. Fuchs F, Bouyer J, Rozenberg P, Senat MV. Adverse maternal outcomes associated with fetal macrosomia: What are the risk factors beyond birthweight? BMC Pregnancy Childbirth. 2013;13(90):1–6.
23. Mahony R, Foley M, McAuliffe F, O'Herlihy C. Maternal weight characteristics influence recurrence of fetal macrosomia in women with normal glucose tolerance. Aust New Zeal J Obstet Gynaecol. 2007;47(5):399–401.
24. Gyurkovits Z, Kálló K, Bakki J, Katona M, Bitó T, Pál A, et al. Neonatal outcome of macrosomic infants: An analysis of a two-year period. Eur J Obstet Gynecol Reprod Biol. 2011;159(2):289–92.
25. Cheng YW, Sparks TN, Laros RK, Nicholson JM, Caughey AB. Impending macrosomia: Will induction of labour modify the risk of caesarean delivery? BJOG An Int J Obstet Gynaecol. 2012;119(4):402–9.
26. Langer O, Berkus MD, Huff RW, Samueloff A. Shoulder dystocia: Should the fetus weighing ≥4000 grams be delivered by cesarean section? Am J Obstet Gynecol [Internet]. 1991;165(1):831–7. Available from: http://dx.doi.org/10.1016/0002-9378(91)90424-P