



Original Research Article

Relationship between placenta weight and birth weight at the Federal Medical Centre, Yenagoa

Received 9 May, 2019

Revised 10 June, 2019

Accepted 14 June, 2019

Published 21 August, 2019

¹Allagoa DO
and

^{1*}Kotingo EL

Department of Obstetrics and
Gynaecology, Federal Medical
Centre, Yenagoa, Bayelsa State,
Nigeria

Corresponding Author Email:
kotingolucky2009@yahoo.com

Undisputedly, the placenta and umbilical cord have been considered to fundamentally contribute to perinatal outcome. Unfortunately, robust reports on this in our setting are lacking. The objective of this study was to determine the relationship between the placenta weight and birth weight of the neonate at term pregnancy in a Tertiary Hospital in the Niger Delta. This was a cross sectional study of labour ward patients in the Obstetrics and Gynaecology Department of Federal Medical Centre, Yenagoa, Nigeria, conducted from 1st of April 2017 to the 1st of August 2017. Data on maternal age, parity, gestational age at delivery, mode of delivery, birth weight, freshly delivered untrimmed placental weight and birth weight were collected from four hundred and eighty-six (486) parturients who met the inclusion criteria and were recruited consecutively. The data was processed using SPSS windows version 22. P value < 0.05 was considered statistically significant. The mean age of respondents was 28.6 ± 5 years. The mean placenta weight was $543 \text{ g} \pm 79$ and birth weight was $3096 \text{ g} \pm 600$. The mean Placenta - Birth Weight Ratio (PBWR) was 17.5%. Placenta weight was positively correlated with birth weight ($P < 0.05$). There was positive relationship between placenta weight and birth weight which was negligible notwithstanding. However, careful examination of the placenta and baby at birth is recommended.

Key words: Placenta weight, birth weight, placenta - birth weight ratio, perinatal outcome, Yenagoa.

INTRODUCTION

Undisputedly, the placenta and umbilical cord have been considered to fundamentally contribute to perinatal outcome. (Ogunlaja and Ogunlaja, 2015; Gowswami et al., 2015; Sirpuurkar and Anjankar, 2015) Several attempts in investigating the use of placenta in our environment have been constrained on the contrary because of scarcity of data on placenta during delivery. Though that was insufficient, the circumstance is additionally compounded by the predominant socio-cultural practice which guarantees that the placenta is handed over to the relatives following delivery for discarding. This is a noteworthy setback in this part of the world on the grounds that there are prevailing challenges of newborn and infant morbidity and mortality resulting from fizzled endeavours at utilizing

the placenta and umbilical cord for anthropometric or biomedical investigations (Ogunlaja and Ogunlaja 2015). This ritual of placenta disposal and its association with birth weight has made it under-investigated and was also noted in Ethiopia (Tiruneh, 2018).

Nevertheless, the placenta is the sentinel predator of the of the intrauterine health status of the unborn child (Gowswami et al., 2015, Sirpuurkar and Anjankar, 2015). It remains the temporary vital organ situated between the mother and developing fetus until the end of pregnancy that is essential for optimal fetal growth (Fowden et al., 2009). The healthy survival of fetus depends on the placenta for normal growth and development (Londhe and Mane, 2011; Aremu et al., 2013). Infact its functions are

comparable with vital body organs like the lung, kidney, heart and digestive organs for transfer of nutrients and gases from the mother to the fetus; removal of waste products from the fetus to the mother. Also, the placenta is a temporary endocrine organ that produces hormones for maintaining pregnancy (Kambale et al., 2016; Gupta et al., 2015; Susmita et al., 2015).

It is known that 'placental size and its microvessels' increase up to the end of the pregnancy as fetal requirements for nutrients increase with increase in gestational age (Lee et al., 2009; Žigic et al., 2010). Invariably, placenta insufficiency can influence normal development of the fetus negatively leading to low birth weight, premature infants, and increased perinatal morbidity and mortality (Barut et al., 2010; O'Brien et al., 2017).

The College of American Pathologists has long endorsed two standard references for biomedical purposes: absolute placental weight and fetal/placenta weight (F/P) ratio (Langston et al., 1997). Proper examination of the placenta can give a clue to the in - utero milieu of the fetus before birth. For instance, smaller placentae may be associated with trisomies, whereas larger ones may be associated with maternal diabetes mellitus. More so, disproportionately small placentas (high F/P ratio) may be seen in maternal hypertension and may cause fetal distress or low APGAR scores (Langston et al., 1997, Hadas et al., 2018). While disproportionately large ones (low F/P ratio) could be a reflection of acute placenta injury resulting in villous edema or a chronic process requiring placenta overgrowth, such as maternal anaemia or malnutrition (Langston et al., 1997; Hadas et al., 2018).

Furthermore, the capacity of the placenta to maintain and sustain adequate nutrient supply is commonly correlated to the birth weight (Tiruneh 2018, Güler et al., 2018; Patimah et al., 2015; Luque-Fernandez et al., 2015). Unfortunately, robust reports on this in our setting are lacking. Hence, paucity of literature on placenta weight and its relationship with birth weight of newborns in Nigeria, particularly the Niger Delta birthed this study.

METHODOLOGY

Study design

This was a cross sectional study of labour ward patients in the Obstetrics and Gynaecology Department of Federal Medical Centre, Yenagoa, Nigeria. It was conducted from 1st of April 2017 to the 1st of August 2017.

Study area

Bayelsa state is a Southern state of Nigeria in the core of the Niger Delta, between Rivers state and Delta state. Federal Medical Centre, Yenagoa is the only Federal Teaching institution in Bayelsa that provides all levels of health-care services to patients particularly from Bayelsa, Rivers and

Delta States, including research and training.

Study population

This consisted of women in labour.

Eligibility criteria

Study population includes 486 pregnant women who presented with labour pain and were enrolled on admission to labour ward.

Inclusion criteria

Nulliparous parturients with Gestational age 37 - 42 weeks (term), Spontaneous onset of labour, Singleton vertex presentation in active phase of labour (Cervical os dilatation of 4 cm) and acceptance to participate in the study after explanation.

Exclusion criteria

Multiparous parturients with gestational age < 37 or > 42 weeks (preterm or postterm), Multiple pregnancy, Induction of labour, Non-vertex presentation, pregnancy with obstetric complications, retained placenta, morbidly adherent placenta, Elective Caesarean Section cases and mothers who declined participating in the study.

Sampling method

Parturients who met the inclusion criteria were recruited consecutively. Labour was then monitored partographically, artificial rupture of membrane (ARM) done in active phase labour and oxytocin augmentation was used in cases with slow progress and inadequate uterine contractions. Vaginal delivery or Emergency Caesarean Section for poor progress in labour due to Cephalopelvic Disproportion was recorded as mode of delivery. These were the information obtained from this study population; maternal age, parity, gestational age at delivery (in weeks), mode of delivery, birth weight, freshly delivered untrimmed placental weight. The gestational age was estimated using last menstrual period (LMP) or done via ultrasound when the LMP was unknown. All placentae were weighed immediately after delivery on table top beam weighing scale together with the membranes and the cord after removing obvious blood clots. The placental-birth weight ratio (PBWR) was calculated as ratio of placental weight to neonatal weight and then multiplied by 100 (Panti et al., 2012). The weights of the neonates were recorded to the nearest gram as appropriate. Weight measurements were made by the nursing staff on duty or the attending resident using the same table top Beam weighing scale.

Study instrument

A structured self-administered questionnaire was designed

and used to collect the said information from the parturients.

Table 1. Birth weight

	Mean	SD	Range (Min-Max)
BW(g)	3096	600	4800 (400-5200)

Table 2. Placenta weight

	Mean	SD	Range (Min-Max)
PW (g)	543	79	3300 (100-3400)

Table 3. Correlation between birth weight and placenta weight

	BW	Test statistics
PW (g)	0.01	Pearson's (r)

Data analysis

The data was processed using SPSS windows version 22. Two methods were used for analysis of data, descriptive and analytical. The descriptive statistics were done by examining the distribution of variables, while in the analytical statistics; t-test was performed for continuous variables, (Chi) square test used for categorical variables and the P value < 0.05 was considered statistically significant.

Ethical considerations

Approval for the study was obtained from the ethical committee of the Federal Medical Centre, Yenagoa. The study was carefully explained to the patients and their informed consent was obtained before recruiting them into the study.

RESULTS

The mean age of respondents was 28.6±5 years. The age of respondents ranged from 17 - 42 years. Majority 335 (68.9%) of mothers were educated to secondary school level, while 112 (23.0%) of the mothers had tertiary education; 36 (7.4%) had primary education; and only 3 (0.6%) had no education. Majority 482 (99.2%) of the respondents were Christians. Most 324 (66.7) of the respondents were from the Ijaw ethnic group; followed by the Igbo ethnic group 115 (23.7%). The mode of delivery was mostly by spontaneous vaginal delivery - 386 (79.4%). Statistically, maternal education and maternal age were both not found to significantly influence birth weight (p >

0.05). However, mode of delivery was found to significantly influenced by birth weight (p< 0.05). The mean Placenta - Birth Weight Ratio (PBWR) was 17.5%.

The Table 1 above shows a mean birth weight (BW) of 3096 g, standard deviation of 600 and range of 400-5200 g. The mean placenta weight (PW) of 543 g, standard deviation of 79 and range of 100-3400 g is shown in Table 2. Table 3 above shows a positive correlation of 0.01 between placenta weight (PW) and birth weight (BW).

DISCUSSION

The mean placenta weight of this study was 543 g which was in the normal category. This was similar to 565 g in South West Nigeria (Adebami et al., 2007) and 590 g in North West Nigeria (Panti et al., 2012), 587 g in Indonesia (Patimah et al., 2015) and 519 g in India (Manop et al., 2006). It was however much less than 630 g in South East Nigeria (Adinma and Agbai, 1995), 630 g in Western Europe (Barker et al., 1995), 670 g in North Central Nigeria (Onche et al., 2017) and 672 g reported in Norway (Strom-Roum et al., 2013). Contrarily, it was more than 477.6 g reported in Bayero university, Kano, Northern Nigeria (Anas and Saleh, 2014) and 470 g in Ukraine (Little et al., 2003). Variations in the technique of preparing and weighing the placenta, maternal nutritional status together with cord clamping time may be responsible for the different values reported in various studies.

The mean birth weight in this study was 3096 g. This was comparable with 3120 g in Ethiopia, 3103 g in the Afro-Caribbean region and 3140 g in India (Little et al., 2003; Tiruneh, 2018, Lurie et al., 1999; Sivaro et al., 2002). However, it was less than 3275 g in North West Nigeria, 3425 g, 3382 g, and 3400 g reported in Ukraine, Western Europe, and Eastern Nigeria respectively (Panti et al., 2012; Little et al., 2003; Barker et al., 1995; Adinma and Agbai, 1995), but Anas and Saleh reported a mean birth weight of 2867.4 g, which was lower than our finding (Anas and Saleh, 2014). Variations in genetics, maternal height, maternal weight, health status and nutrition may be responsible for the slight differences here and there among study populations.

The placenta - birth weight ratio is a reflection of the fetal and placental growth patterns (Tiruneh, 2018; Patimah et al., 2015, Güler et a 2018, Luque-Fernandez et al. 2015). In this study, the mean PBWR was 17.5%. This was similar with 17.1% and 18.2% reported in Thailand and Sokoto (North West Nigeria). It was however higher than 13.9% in Ukraine but less than 19.5%, 20.0%, 20.3% and 20.4% respectively among aforementioned European, African (North Central Nigeria), Asian and Afro-Caribbean studies. Furthermore, there was a positive correlation of 0.01 between placenta and birth weight in our study, this signifies that as placenta weight is increasing, birth weight is also increasing. However, according to the rule of thumb, this correlation is negligible. This weak correlation was also reported by Panti et al., 2012 at the Usmanu Danfodiyo

University Teaching Hospital, Sokoto, Nigeria. Positive correlations have been documented in other studies (Tiruneh, 2018; Güler et al., 2018; Patimah et al., 2015; Luque-Fernandez et al., 2015).

The mean age of respondents was 28.6 ± 5 years with respondents ranging from 25 (17 – 42 years). This is also similar with documented study age group (Panti et al., 2012; Manop et al., 2006). Statistically, maternal education and maternal age were both not found to significantly influence birth weight ($p > 0.05$). But, mode of delivery was found to be significantly influenced by birth weight. ($p < 0.05$).

CONCLUSION

There was positive relationship between placenta weight and birth weight which was negligible notwithstanding. However, careful examination of the placenta and baby at birth is recommended.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of the paper.

REFERENCES

- Adebami OJ, Owa JA, Oyedeji GA (2007). Factors associated with placenta weight and placental weight? birth weight percent (placenta ratio) among women in Ilesa, South western Nigeria. *Int. Trop. Med.* 2(2):68-73.
- Adinma JI, Agbai AO (1995). Fetal birth weight in Africa. *J Obstet Gynaecol* 15:295-297.
- Anas IY, Saleh MS (2014). Birth Weight and Placental Weight Correlation of Fulani Ethnic Group Parturients in Nigeria. *British J. Med. & Med. Res.*, 4(4): 1049-1055.
- Aremu AA, Atanda OO, Adeomi AA (2013). Newborn birth weight and placental parameters in normal human pregnancies. *J. Pharma. Biomed. Sci* 30:23-27.
- Barker DJ, Bull AR, Osmond C, Simmonds SJ (1990). Fetal and placental size and risk of hypertension in adult life.
- Barut F, Barut A, Gun BD, Kandemir NO, Harma MI, Harma M, Aktunc E, Ozdamar SO (2010). Intrauterine growth restriction and placental angiogenesis. *Diagnostic Pathology.* 5:24. <http://www.diagnosticpathology.org/content/5/1/24>.
- Dibyajyoti B, Mohanlal K, Malik A, Arijit S and Prabal D (2017). Correlations of Morphometric Placental Microvessels Parameters with Birth Weight. *AAMS.* 1(1):7-15.
- Fowden AL, Sferruzzi-Perri AN, Coan PM, Constanica M, Burton GJ (2009). Placental efficiency and adaptation: endocrine regulation., *J. Physiol.* 587:3459-3472.
- Gowswami P, Memon S, Rathore MI (2015). Feto-placenta weight relationship in normal pregnancy and pregnancies complicated by pregnancy induced hypertension and abruption of placenta. *Int. J. Res. in Medical Sci.* 3:1081-1084.
- Güler AE, Atasever M, Fidan U, Artürk E, Kinci MF, Bodur S (2018). The relationships between pregnancy-associated protein A levels, placental localization and fetal birth weight. *Obstetrics, Gynecology and Reproduction.* 12(4):15-20.
- Gupta C, Harode HA, D'souza AS, Sharma A (2015). A morphological and morphometric study of placenta with its clinical implications. *Tropical Journal of Medical Research.* 18:85-88.
- Hadas GH, Dekalo A, Jubran L, Schreiber L, Bar J, Kovo M (2018). Obstetric outcomes and placenta findings in gestational diabetes patients according to maternal pregnancy weight and weight gain. *The J. Maternal-Fetal and Neonatal Medicine.* 32(10):1682-1687.
- Kambale T, Iqbal B, Ramraje S, Swaimul K, Salve S (2016). Placental morphology and fetal implications in pregnancies complicated by pregnancy-induced hypertension. *Medical J. DY Patil University.* 9:341-347.
- Langston C, Kaplan C, Macpherson T, Mancini E, Peevy K, Clark B, Murtagh C, Cox S, Glenn G (1997). Practice guideline for the examination of the placenta: developed by the Placental Pathology Practice Guideline Development Task Force of the College of American Pathologists. *Arch Pathol Labor Med.* 121:449-476.
- Lee MY, Huang JP, Chen YY, Aplin JD, Wu YH, Chen CY et al (2009). Angiogenesis in differentiated placental multipotent mesenchymal stromal cells is dependent on integrin alpha5beta1. *PLoS One.* 4: e6913.
- Little RE, Zadorozhnaja TD, Hulchiy OP, Mendel NA, Shkyryak-Nyzhnyk ZA, Chyslovska N et al (2003). Placenta weight and its ratio to birthweight in a Ukrainian city. *Early Hum Dev.* 71:117-127.
- Londhe PS, Mane AB (2011). Morphometric study of placenta and its correlation in normotensive and hypertensive pregnancies. *International Journal of Pharma and Bio Sciences.* 2:429-437.
- Luque-Fernandez MA, Ananth CV, Jaddoe VWV, Gaillard R, Albert PS, Schomaker M (2015). Is the fetoplacental ratio a differential marker of fetal growth restriction in small for gestational age infants? *Eur. J. Epidemiol.* 30:331-41. 390.
- Lurie S, Feinstein M, Mamet Y (1999). Human fetal-placental weight ratio in normal singleton near-term pregnancies. *GynecolObstet Invest.* 48:155-7.
- Manop J, Ounjai K, Alan G (2006). Placenta Weight and its Ratio to Birth Weight in Normal Pregnancy at Songkhlanagarind Hospital. *J Med Assoc Thai.* 89(2):130-137.
- O'Brien M, Braczyk D, Kingdom JC (2017). Endothelial dysfunction in severe preeclampsia is mediated by soluble factors, rather than extracellular vesicles. *Sci Rep.* 7:5887
- Odessa P. Hamidi, Hameroff A, Kunselman A, William MC, Risha S, Serdar H (2018). Placental thickness on ultrasound and neonatal birthweight. *Ural J. Perinatal Medicine.* 131:182S-183S.

- Ogunlaja OA, Ogunlaja IP (2015). Correlation between umbilical cord length, birth weight and length of singleton deliveries at term in a Nigerian population. *RMJ* Vol.72 (3)
- Onche EP, Zaiyol ST, Ochigbo OA, Terkimbi UB, Avershima OA, Kuma HHS (2017). Placenta-birth weight ratio at term at Benue State University Teaching Hospital, Makurdi, North Central Nigeria. *Res Rep Gynaecol Obstet.* 1(3):16-18.
- Panti AA, Ekele BA, Nwobodo EI, Yakubu A (2012). The relationship between the weight of the placenta and birth weight of the neonate in a Nigerian Hospital. *Niger Med J.* 53:80-4
- Patimah S, Syauqi Y, Thaha AR (2015). The Correlation between Placental Weight and Birth Weight. *International Proceedings of Chemical, Biological and Environmental Engineering,*
- Strøm-Roum EM, Haavaldsen C, Tanbo TG, Eskild A (2013). Placental weight relative to birth weight in pregnancies with maternal diabetes. *Acta Obstet. Gynecol Scand.* 92(7):783-789.
- Susmita S, Lopamudra N, Shashi SB, Prafulla KC (2015). Morphometric study of placenta of full term newborn & its relation to fetal weight: a study in Tertiary Care Hospital of Odisha. *J. Evolution of Medical and Dental Sci.* 4:742-7.
- Tiruneh ST (2018). Correlation between gross morphology of the human placenta and birth weight in normotensive and pre-eclamptic pregnancies in Northwest Ethiopia. *Anatomy.* 12(1):27-32.
- Žigic Z, Markovic S, Grbeša D, Ramic S, Halilovic A (2010). Quantitative research of capillaries in terminal villi of mature placentae. *Bosnian J. basic Med. Sci.* 10 (2): 147-152.