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Relationship Between Maternal Bmi And Placental Weight In Relation With Foetal Outcome Amongst Neonates In Federal Teaching Hospital, Abakaliki, Ebonyi State

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Abstract:

Foetal outcome, as reported by many researchers across the globe, is affected by many factors of which maternal anthropometric parameters (maternal weight, height and body mass index) are inclusive. The present study was aimed at establishing the significance of the impact of maternal body mass index on neonatal outcome of neonates in Federal Teaching Hospital, Abakaliki, Ebonyi State. A total of 125 subjects were employed in the study. The informations and specific datas of each subject were obtained using a well structured proforma. The datas were tabulated using simple frequency table and presented graphically using bar chart. The degree of significance was determined using Chi-square test of significance. The result obtained showed that the overall mean neonatal birth weight was 3.7 ± 4.15 kg. The mean neonatal birth weight, as recorded in the present study was within the acceptable range while the maternal body mass index was high as compared to the normal range (20-24.9kg/m²). The neonatal birth weight was significantly dependent on the gender of the neonates ($p < 0.05$) but maternal BMI insignificantly ($p > 0.05$) contributes to the birth weight of neonates in the current study. Future researchers are encouraged to consider other effective factors besides maternal BMI such as both parental anthropometry and placental ratio in future studies.

Keywords: Birth Weight, Neonate, Body Mass Index, Anthropometry

Introduction

In this century, fetal growth restriction continues to be a significant perinatal problem (Eknayan, 2007). A growth restricted fetus is one with an estimated fetal weight of less than the tenth percentile for that gestational age. The prevalence of growth restricted fetuses is known to be about 10% (Keys *et al.*, 2002). The incidence of fetal growth restriction varies depending upon the

population residing in the developing and developed countries with a incidence rate of 6–30% to 2–5% in these countries, respectively (Fareed and Afzal, 2014). The highest rate of prevalence of fetal growth restriction is found in Asia, particularly in Southeast Asia, followed by Africa and Latin America (MacKay, 2010). These statistics make the fetal growth restriction during pregnancy a major public health concern

throughout the world, especially in the developing countries with a huge population base, a lack of good and affordable health care infrastructure, and a low patient-physician ratio. Fetal growth restriction or intrauterine growth restriction (IUGR) cannot be termed into a specific disease entity per se, but it is rather a complex multi-factorial condition. It is manifested as a result of several fetal and maternal disorders (Gadzik, 2006). The factors affecting fetal growth restriction are the nature of the etiological agents and the duration of gestation (Shiwaku *et al.*, 2003). These factors can be classified into maternal, fetal, placental, and environmental factors. The maternal factors consist of preeclampsia, diabetes mellitus, and heart diseases. The fetal factors include aneuploidy, chromosomal abnormalities, and multiple gestations. The placental factors comprise placenta previa, placenta accreta, abruptio placentae, and finally the environmental factors, such as smoking, drugs, maternal malnutrition, illiteracy and low socio-economic status are involved in fetal growth restriction (Katherine *et al.*, 2013). In 2006, attendees at the Institute of Medicine conference on the impact of pre-pregnancy weight on maternal and child health recommended that further research be done on the influence of weight gain in pregnancy. Some researchers have agreed with the Institute of Medicine's initial recommendations for maternal weight gain during gestation (Shiwaku, 2003); however, recent studies suggest that lower gestational weight gain may be preferable. In developing African countries, such as Nigeria, women generally have a lower BMI and/or a smaller gestational weight gain than in developed countries. In the USA, for example, 2% of pregnant women have a BMI < 18.5 and more than 50% have a BMI > 25 (Gadzik, 2006). Hence, BMI seems to differ

across populations. Taking this into account in combination with the possible effects of maternal BMI on pregnancy outcomes, there is a requirement to examine whether the current recommendations for pregnant women from the USA also apply to women from other countries such as Nigeria. The fetal growth restriction makes the fetus more prone to perinatal morbidity and mortality due to the failure of a fetus to attain its complete growth potential (Shiwaku, 2003). It also increases its risk for long term consequences, such as coronary heart disease, type-2 diabetes mellitus, hypertension, and metabolic syndrome. Therefore, having knowledge of predisposing extrinsic factors may help in early diagnosis, prompt intervention and better management, which can ultimately lead to good obstetric care during fetal growth restriction. To examine the effect of maternal parameters such as body mass Index (BMI), on placental weight and diameter followed by its effect on the growth of the fetuses.

Materials and method

Study Area: The study was carried out at the Department of Pediatric and Obstetric unit of Federal Teaching Hospital, Abakaliki, Ebonyi State, South Eastern Nigeria.

Study Population: The sample size for this study was one hundred and twenty five mother-neonatal pairs. A pregnant woman was eligible for participation in the study at the labor ward of FETHA before delivery and met the following study inclusion criteria:

- (i) had an uncomplicated singleton birth at term.
- (ii) had no known underlying chronic illness and not on drugs other than the ones used for routine antenatal care. Mothers who smoke cigarette and drink alcoholic beverages or coffee were also excluded from this study.

Ethical clearance: The consent of the Chief Medical Director, FETHA was sort and obtained. The approval was on the agreement that patient anonymity must be maintained, best clinical practice be ensured, and that every finding would be treated with utmost confidentiality and for the purpose of this research only.

Sampling Technique: Mother-neonatal pairs were enrolled in this study using the systematic random sampling method where the first of every four mother-neonatal pairs were picked at the labor ward. Where the first mother-neonatal pair did not fulfill the inclusion criteria above, the immediate next mother-neonatal pair that qualified was selected. On enrolment of the mother-neonatal pairs, study proforma were administered to the mothers to collect information on their bio-data, pregnancy history and antenatal care history. Information was also obtained on the delivery outcome which included the sex of the neonates. The birth weight of the neonates in kilogram was determined using the bassinet weighing scale which has a sensitivity of 50 grams. Maternal BMI was calculated from maternal weight and height using the formula maternal body weight divided by the square of maternal height in kilogram/meter square (kg/m²) (Yazdani *et al.*, 2012). Maternal weight and height were measured using Salter weighing scale and stadiometer in Kilogram (kg) and metre (m) respectively.

Statistical Analysis: Means and standard deviations (SD) were calculated for neonatal birth weight, maternal BMI, maternal weight and height. Chi-square test of association was used to investigate the effect of maternal pregnancy BMI on neonatal birth weights. Statistical analysis was performed using statistical package for social science (SPSS) statistical software version 16.0. Statistical significance was defined as a p value <0.05. Tables were used for illustrations. Maternal BMI was categorized into three sub groups as follows: 1) Low: BMI ≤ 19.9 kg/m², 2) Normal: BMI of 20-24.9 kg/m², 3) High: BMI ≥ 25 kg/m² (Yazdani *et al.*, 2012).

Result

A total of 125 mother-neonatal pairs participated in this study. There were 55 (46.4 %) males and 49 (53.6 %) females. Majority of the neonates 87 (69.6 %) had high birth weight (Table 4.1). Figure 4.1 revealed the distribution of neonatal birth weight, maternal body mass index, maternal weight and height. Overall mean neonatal birth weight was 3.7±4.15 kg. Table 4.2 shows neonatal birth weight profile and maternal body mass index of the subjects. Association between neonatal birth weight and maternal body mass index was not significant ($\chi^2 = 0.909$, $p = 0.635$).

Table 4.1: Birth weight and sex distribution of the neonates

Neonatal birth weight (kg)	Male n (%)	Female n (%)	Total n (%)	X ² -value
LBW (< 2.5)	3 (18.8)	13 (81.3)	16 (12.8)	5.6404
ABW (≥ 2.5)	55 (50.5)	54 (49.5)	109 (87.2)	0.017551
Total	58 (46.4)	67 (53.6)	125	

LBW = Low birth weight, ABW = Acceptable birth weight; test of significance was determined at 0.05 level of significance.

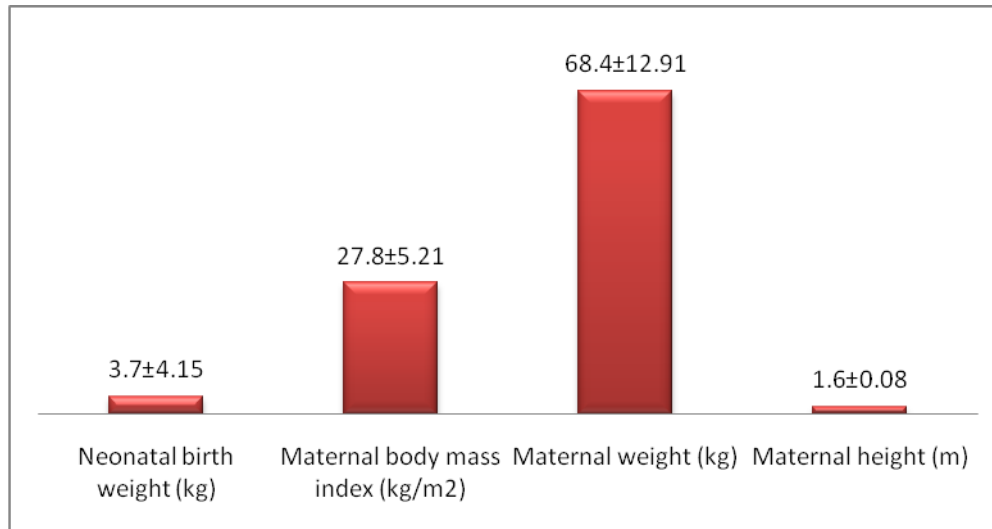


Figure 4.1: Mean ± standard deviation of neonatal birth weight, maternal body mass index, maternal weight and height of the study population

Table 4.2: Test of significance of the association between neonatal birth weight and maternal body mass index

Maternal BMI (kg/m ²)	Neonatal birth weight (kg)		TOTAL (%)	X ² -value	p-value
	LBW < 2.5 (%)	ABW ≥ 2.5 (%)			
Low (≤ 19.9)	0 (0.0)	2 (100.0)	2.0 (1.6)	0.909	0.635
Normal (20-24.9)	6 (16.7)	30 (83.3)	36 (28.8)		
High (≥ 25)	10 (11.5)	77 (88.5)	87 (69.6)		
TOTAL	16 (12.8)	109 (87.2)	125		

LBW = Low birth weight, ABW = Acceptable birth weight, MAT =Maternal, BMI = Body mass index; test of significance was determined at 0.05 level of significance.

Discussion of findings

Studies have shown that neonatal birth weight is directly dependent on the maternal body mass index (Upadhyay *et al.*, 2011; Thorsdottir *et al.*, 2002). The mean neonatal birth weight, as recorded in the present study is within the acceptable range while the maternal body mass index is high as compared to the normal range (20-24.9kg/m²) established by WHO (Yazdani *et al.*, 2012). This findings were dissimilar to reports

elsewhere (Upadhyay *et al.*, 2011) but is concurrent with the findings of Thorsdottir *et al.* (2012) in Iceland. The similarity between the present study and the latter author may be as a result of the similarity between the developmental states of the two countries. Developed countries are associated with better health care, social services and low poverty rates compared to developing countries. This in turn may rates of infections, hunger and malnutrition in populations resident in developed countries. The result of

which could be increased prevalence of high maternal BMI that could lead to increased neonatal birth weight outcome (Thorsdottir *et al.*, 2012).

Statistical analysis shows that neonatal birth weight was significantly dependent on the gender of the neonates ($p < 0.05$). Also, maternal BMI insignificantly ($p > 0.05$) contributes to the birth weight of neonates in the current study. Similar observation was made by researchers elsewhere (UshaKiran *et al.*, 2005). In another study, maternal pregnancy BMI was found to have strong association with birth weight of neonates in Asia (Upadhyay *et al.*, 2011). Variation of observations in the latter study and that of the present study could be due to differences in study design because Landmann *et al.* in (2006) have suggested a BMI cut off point of 23.0 for obesity in Asian populations. One reason that could be offered for this would possibly be due to the small build of individuals found in the Asian continent. The above BMI set point for obesity is lower than the standard value that is applied for most population worldwide. Therefore, research findings of this nature may differ in many parts of the world due to lack of uniform standards of importance is that parental genetic factors are the greatest contributors to neonatal birth weight (Johnston *et al.*, 2002).

Conclusion

This research demonstrated that maternal pregnancy BMI did not contribute significantly to neonatal birth weight outcome of our subjects. Clinicians and public health policymakers should not place undue expectations that maternal pregnancy BMI will have a large beneficial impact on the birth weight outcome of neonates. The present study had some limitations. For example, this study was performed in FETHA and

does not cover all hospitals in Ebonyi, which may affect the external validity of the findings. In addition, the study sample was not homogeneous with regard to age, education and socio-economic status. All these factors may impact quality of life and maternal pregnancy BMI and, hence, the study results. The researcher suggest to future researchers to consider other effective factors besides maternal BMI such as both parental anthropometry and placental ratio in future studies.

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