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10

Gender Differences In Neonatal Birth Weight, Length And Head Circumference*

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**This paper was first presented at the 5th ICHPER.SD Africa Region Congress, University Of Ibadan, Ibadan, Nigeria (February 2-5, 2011), as a keynote paper by the presenting author- Prof. A. P. Agbonjinmi. The empirical aspect of the paper only is herein reported. The professional admonition and political aspects of the paper, being the authors' views, have been removed.*

Introduction

Recently, Paediatricians in Nigeria reported the incidence of increase in mortality rate of children below the age of five years. The increase in mortality rate of children below the age of one year was emphasised. This report suggests increase in neonatal deaths, that is, death during the first

month of life. Size at birth is associated with perinatal morbidity and mortality as well as with diseases such as CVD and Type II diabetes at adulthood (Astrid Lunde. et al., 2007).

Body length and head circumference (HC) are important prognostic and etiologic indicators that can be used to assess the quality of intrauterine growth. The measures of birth length and HC are however not as predictive of mortality and morbidity as birth weight by gestational age (William J. Kieran et al., 2007). The measure of birth body length and head circumference can be used to diagnose abnormalities in body proportions such as achondroplasia, hydrocephalus, and microcephalus (Usher, R. and F. McLean 1969).

Correlation between birth size and adult disease have been explained by alteration in foetal nutrition and endocrine status "which permanently change the feotus and predispose individuals to adult disease" (Astrid Lunde et al., 2007). It has been reported that children and adults who were small at birth tend to have reduced lung function and increased risk of respiratory mortality (with consequential effects for endurance performance) and mortality (Jane S. Lucas et al., 2004).

Objective

Neonatal mortality rate is reported to be higher in male children compared with female children (M. M. Rahman and S. Abidin, 2010). Earlier research reports by P. Morgan (1984) observed sex-linked foetal genetic variation in birth weight, however, later studies have not (P. Magnus et al., 1993; P. Magnus et al., 2001).

This study was designed to examine gender differences in neonatal birth weight, crown-heel length and head circumference (HC) of live births at the University of Uyo Teaching Hospital, Uyo from 2006 to 2010.

Method And Procedures

The method employed in this study was content analysis. Existing information on birth weight, crown-heel length and head circumference

(HC) of 143 singleton subjects were selected from 2006 to 2010 (opportunity sampling). Since the samples were not randomly selected, the samples may not fully be representative of broader population of neonates for each year of study. In 2006, 13 male and 17 female singletons were selected. In 2007, 14 male and 16 female singletons were selected. In 2008, 13 male and 16 female singletons were selected. In 2009, 13 male and 17 female singletons were selected while in 2010, 10 male and 14 female were randomly selected.

Limitations

The measurement of crown-heel length and head circumference usually present difficulties and requires a combination of skill, speed, and patient. Variations in birth length can be attributed to varying muscle tonus and the extent of stretching the child during measurement. "For head circumference, the presentation at birth (breech or cephalic), the way the head is placed in the pelvic toward the end of pregnancy, and the duration of the second stage of labor" may be important sources of variations (Astrid Lunde et al., 2007).

We excluded gestational age as a result of the acknowledged uncertainty in estimations based on menstrual date and the inaccessibility of ultrasound data from available medical records.

Data Analyses

Descriptive statistics (mean, standard deviation and range) and independent t test for differences were employed in data analyses.

Results and Discussion

The results of this study are presented in Tables 1 and 2. The results of this study revealed high variations in birth weights in both male and female neonates in 2008 and 2009. High variations were also observed in crown-heel lengths in both male and female neonates in 2007, 2008 and 2010. Also, head circumference varied widely amongst female neonates in 2006.

Table 1: Descriptive Statistics of Neonatal Anthropometric Variables

		Male		
Year	Variables	Mean	SD	Range
2006	Wt, Kg(N=13)	2.96	0.46	2.6 - 3.8
	Length, cm	40.31	1.25	38.0 - 42.0
	Hc, cm	29.62	0.87	28.0 - 31.0
2007	Wt, Kg(N=14)	3.02	0.46	2.1 - 3.6
	Length, cm	43.57	3.06	40.0 - 49.0
	Hc, cm	31.03	1.64	28.0 - 33.0
2008	Wt, Kg(N=13)	3.03	0.60	2.4 - 4.3
	Length, cm	44.54	3.60	40.0 - 50.0
	Hc, cm	31.69	1.89	30.0 - 35.0
2009	Wt, Kg(N=13)	3.05	0.66	2.4 - 4.4
	Length, cm	48.31	1.89	45.0 - 52.0
	Hc, cm	31.85	1.72	30.0 - 34.0
2010	Wt, Kg(N=10)	3.14	0.40	2.6 - 3.9
	Length, cm	48.20	3.43	42.0 - 51.0
	Hc, cm	33.53	0.86	32.4 - 35.0
			Female	
2006	Wt, Kg(N=17)	2.91	0.48	2.3 - 3.8
	Length, cm	39.82	1.59	36.0 - 42.0
	Hc, cm	29.29	3.10	21.0 - 37.0
2007	Wt, Kg(N=16)	2.89	0.49	2.2 - 3.6
	Length, cm	44.06	3.68	39.0 - 49.0
	Hc, cm	30.94	1.65	28.0 - 34.0
2008	Wt, Kg(N=16)	3.09	0.55	2.4 - 4.2
	Length, cm	46.14	2.76	43.0 - 50.0
	Hc, cm	31.75	1.34	32.0 - 34.0
2009	Wt, Kg(N=17)	3.39	0.65	2.4 - 4.4
	Length, cm	46.29	1.86	46.0 - 52.0
	Hc, cm	32.29	1.72	30.0 - 34.0
2010	Wt, Kg(N=14)	3.22	0.47	2.6 - 3.9
	Length, cm	46.21	3.02	44.0 - 51.0
	Hc, cm	34.37	1.78	33.0 - 38.2

The wide variations in these variables can be attributed to variability in interobserver measurement errors or differences in maternal nutrition as the major source of variability in these parameters since the measurement of these variables is part and parcel of the training curriculum in nursing and midwifery schools.

Male neonates were slightly heavier than female neonates in 2006 and 2007 while female neonates were slightly heavier than male neonates in 2009 and 2010. Male neonates were slightly longer than female neonates in 2006 and 2010 while female neonates were longer than male neonates in 2007, 2008 and 2009. In respect of head circumference, male neonates showed higher circumferences than female neonates in 2007 while female neonates revealed higher values than male neonates in 2009 and 2010. These findings are contrary to William J. Kierans et al. (2007) report that observed greater average length and circumference in male neonates than female neonates in British Columbia, Canada. This disparity in findings is attributed to differences in procedures as William J. Kierans et al study was based on gestational age.

Table 2: Table of Calculated Independent-ts

Year	Variables	Calculated t	Significance
2006	Weight	0.2851	Not Significant
	Length	0.9003	Not Significant
	Head Circum.	0.3660	Not Significant
2007	Weight	0.7559	Not Significant
	Length	-0.3993	Not Significant
	Head Circum.	0.1516	Not Significant
2008	Weight	-0.2795	Not Significant
	Length	-1.3528	Significant at .20
	Head Circum.	-0.0998	Not Significant
2009	Weight	-1.3945	Significant at .20
	Length	-1.3979	Significant at .20
	Head Circum.	-0.6821	Not Significant
2010	Weight	-0.4439	Not Significant
	Length	1.5127	Significant at .20
	Head Circum.	-1.3843	Significant at .20

There were no significant (p = .20) gender differences in birth weight, crown-heel length and head circumferences in 2006 and 2007. Female neonates revealed significant (p = .20) gender differences in length in 2009; and length and head circumference in 2010. The significant difference in birth weights in 2009 is attributed to differences in maternal nutrition. In a study designed to estimate and compare the contributions of foetal and maternal genetic factors and sibling environmental factors to birth weight, length and head circumference, Astrid Lunde et al. (2007) observed that the relative importance of foetal genes on the phenotypes was greatest for birth length and somewhat less important for head circumference and equally important for both length and birth weight. Furthermore, Astrid Lunde et al., (2007) reported that foetal genetic effects were of more importance, and that the common full and half sibling environmental effects were of less importance for birth length and head circumference than for birth weight. They concluded that this may suggest that birth weight is more influenced by nutritional factors and placental function than are length and head circumference. Maternal factors such as diet and lifestyle habits (e.g. smoking during pregnancy) are of less importance for length than for birth weight.

Conclusion And Recomendation

If birth weight is crucial to the survival of neonates, our data suggest that male neonates would have contributed to high morbidity and mortality of neonates in Uyo metropolis and environ in 2009. The findings of this study suggest the need for nutrition and changes in lifestyle education for pregnant women. The issue of food security requires the urgent attention of policy makers at all tiers of governance.

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