J Expt. & Clin. Anat. 10 (1)1-4

JECA

Clinical Surveillance of Femoral Length of Term Babies Born of Nigerian Parents at Birth

*[1]I.C NWAOKORO, [2]C.N ORISH , [1]V.C EZEUKO

[1]Department of Anatomy, School of Basic Medical Sciences, College of Medical Sciences, University of Benin, Benin City, Edo State
[1]Department of Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, University of Port Harcourt, Choba, Rivers State

*Author for Correspondence

ABSTRACT

The objective of this study was to determine the effects of maternal status, position/parity and sex of the baby at birth on the length of femur in UPTH and BMH, Port Harcourt. Maternal status included educational level, age, and occupation of the mother. A total of 140 singleton babies (65 males and 75 females) were randomly selected for this study. The length of femur at birth ranged from 8cm to 14cm with mean ± SEM of 11.42±0.09 i.e. standard error of mean (SEM). 65 of the babies were males with mean ± SEM of 11.45±0.13 and 75 were females with mean ± SEM of 11.40±0.13. The result showed that the relationship between the length of femur at birth and the maternal status i.e. educational level, age and occupation was not significant ($p>0.05$). Also, the relationship between the length of femur at birth and the position/parity and sex of the baby at birth was not significant ($p>0.05$). This study has shown that although the length of femur at birth have no significant effect on the maternal status, position and sex of baby at birth, it may be of good parameter in the assessment of a newborn when used as one of the parameters for the assessment of a newborn.

Key words: Length of femur, maternal status, position, sex.

The femur is the longest and largest bone in the body. The head of femur articulates above with the acetabulum of the hip bone to form the hip joint (a ball and socket type of synovial joint) while the condyles of the distal end of femur articulates with the corresponding condyles of the proximal end the tibia to form the knee joint.

The femur presents two trochanters proximally (greater and lesser) and two condyles distally (medial and lateral). They appear at various times from just before birth to about age 14. Initially, they are joined to the main body of the femur with cartilage, which gradually becomes ossified until the protuberances become an integral part of the femur bone, usually in early adulthood.

The femoral length can be used to roughly estimate a person's height. To increase accuracy of this bone-to-height relationship, you will also need to know both the gender and race of the individual. These factors affect the relationship between long bone length and the individual's height.

It has become evident that in populations living in economically poor areas, the prevalence of stunting at birth (short crown-heel length-for-gestational age) may be as high as 50% (Neufeld *et al* 1999; Ruel 2001).

The negative postnatal consequences and potential catch-up growth of infants who are born stunted have been documented. Stunting at birth is associated with an increased risk of stunting in later childhood and stunted adult height (Ruel 2001, Ruel *et al* 1996). Poor physical work capacity (Haas *et al* 1996, Spurr 1984); the negative consequences last at least into adolescence and early adulthood (Martorell *et al* 1998). The timing of stunting may also be important. In one study, infants were measured from birth to 2 years of age, and those who were identified as stunted sooner after birth tended to be more severely stunted and to suffer from more negative outcomes (Mendez and Adair, 1999). Infants who were born stunted were more likely to benefit from nutritional supplementation than those who were not stunted at birth (Ruel *et al* 1996). This suggests that, given sufficient resources and early intervention, infants who are born stunted may be able to catch up in growth in the postnatal period. Of those infants who are born stunted because of genetic factors, not fetal growth faltering, one would

not expect to see the adverse outcomes mentioned above or not nor catch-up growth in the postnatal period.

Multiplying femur length by seven during the second half of gestation will give a good indication and prediction of total fetal and neonatal growth (Falkner and Roche 1987). Growth patterns of the humeral and femur length in a multiethnic population was found to be significantly different in limb lengths but no difference in birth weights of the three ethnic groups studied I.e. Indian, Malay and Chinese, gender or parity (Rama, S. *et al* 1996). Femur length is a scale for estimating the fetal weight in individual races because fetal growth patterns differ among different races (Raziah Dahghani Firoozadadi, *et al* 2007). Estimation of fetal weight using length of femur does not depend on the age and BMI of the mother, sex of noeonate or parity (Firoozadadi, *et al* 2007).

A study on maternal risk factor and their influence on fetal anthropometric measurements using length of femur at birth and other parameters showed that the infant length of femur and other parameters were shown to have a negative effect on fetal weight. The timing of the impact, its magnitude and the specific anthropometric measurement affected were different for each maternal risk factor (Goldenberg, Robert L. and Co; 1993).The association between birth weight, sociodemographic variables and maternal anthropometry in an urban sample from Dhaka, Bangladesh, mothers weight at term was the best single predictor of low birth weight (LBW), while maternal weight along with age, educational level and income group correctly predicted LBW. Also, mother's weight at term was the best predictor of birthweight (Karim, E. *et al* 1997). Anthropometric biochemical measurements used to evaluate nutritional status and physiological maturity of the mother and newborn the accumulation of calories in the fetus was less in adolescent mothers than of older mothers (Frisanocho, A.R *et al* 1983). Body composition in pregnancies of adolescents and mature women and the relationship to birth weight differs and if adequate weight and lean body mass are attained, it impacts positively on the birth size irrespective of age (Thame, M. *et al* 2006).

This study is aimed at evaluating the effect of maternal age, educational level and occupation of mother as well as parity/position of the baby, sex of the baby at birth on the length of femur at birth in a Nigerian population.

MATERIALS AND METHOD

In this survey, one hundred and forty (140) singleton babies born of Nigerian mothers were used. This comprised of 65 (40.7%) males and 75(59.3%) females. This survey was carried out between the 2nd week of August and the 1st week of October 2007 at University of Port Harcourt Teaching Hospital (UPTH), and Braithwaite Memorial Hospital (BMH), Port Harcourt, Rivers State.

All the pregnant women were those who registered with these hospitals i.e. UPTH and BMH and went through antenatal and postnatal. The women were admitted during the onset of labor and observed till delivery time and through post natal and infant clinics. All the infants used were full term babies. Infants of diabetic mothers were excluded. Measurement of the length of femur was done within the first three (3) hours of delivery. The measurement of the length of femur was done by measuring the distance from the greater trochanter to the lateral condyle of the femur using a calibrated nylon tape graded in centimeter (cm). The length was measured to the nearest 0.1cm.

Information on maternal age, educational level of the mother and position of the baby among the siblings was extracted directly from the mother's folders with the help of the chief matron.

Obtained data were subjected to statistical analysis using the Statistical Package for Social Sciences version 16.

RESULTS

Table 1: Comparison of the Length of Femur at birth between males and females

	All	Male	Female
Number	140(100%)	65(46.4%)	75(53.6%)
Mean +SEM	11.42±0.09	11.45± 0.13	11.40±0.13
probability		0.778	

From table 1 above, there was no statistically significant difference ($p>0.05$) in the length of femur between males and females.

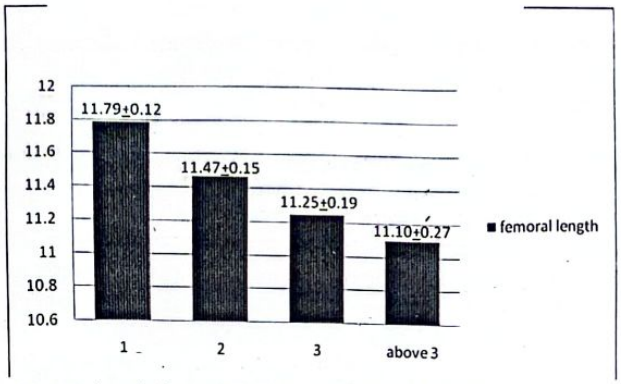

Figure 1: relationship between femoral length at birth and parity of the mother

From figure 1 above the femoral length of the babies decreased with increased maternal parity. However this correlation was not statistically significant ($p>0.05$; coefficient of correlation, R=-0.19)

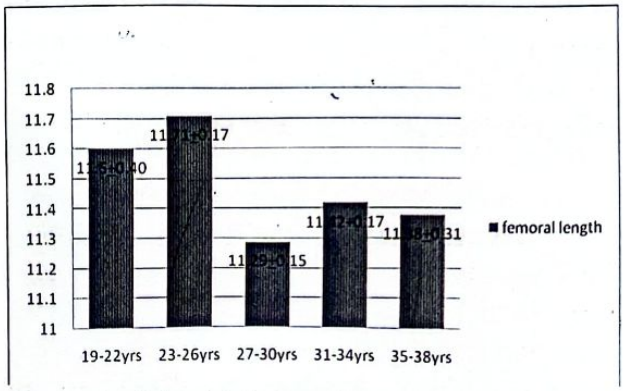

Figure 2: relationship between femoral length at birth and maternal age

From figure 2 above, the maximum femoral length at birth was recorded in babies delivered by mothers of age group 23-26 years and minimum in mother of age group 27-30 years. There was however no significant correlation ($p>0.05$; R=-0.07) between maternal age and femoral length at birth.

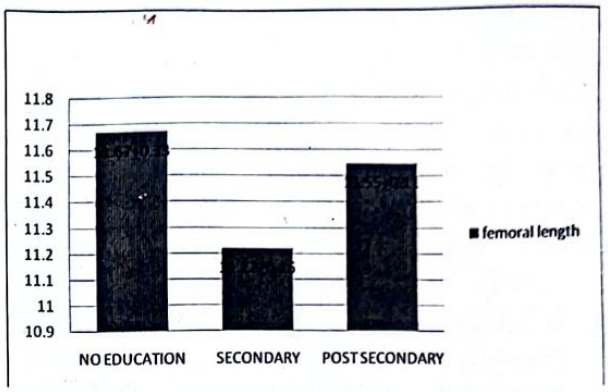

Figure 3: relationship between femoral length at birth and maternal educational level

From figure 3 above, the maximum femoral length at birth was recorded in babies delivered by mothers with no education and minimum in mother with secondary education as their highest level of education. There was however no significant correlation ($p>0.05$) between maternal educational level and femoral length at birth.

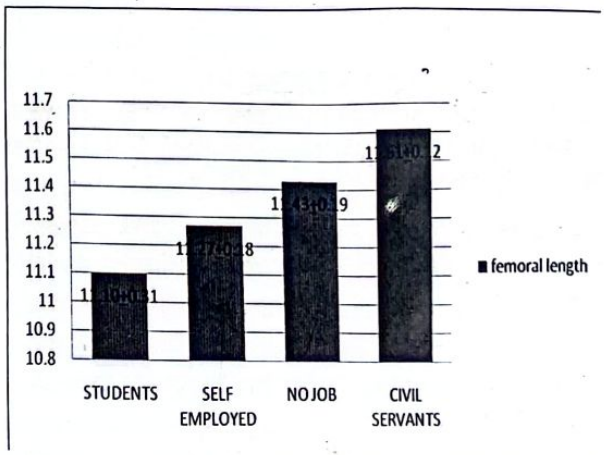

Figure 4: relationship between femoral length at birth and maternal occupation

From figure 4 above, the maximum femoral length at birth was recorded in babies delivered by mothers in civil service and minimum in student. There was however no significant correlation ($p>0.05$) between maternal occupation and femoral length at birth.

DISCUSSION

The result of this survey using 140 singleton infants has actually thrown more light to this field. The result obtained from this study has shown that length of femur at birth has no significant effect on sex and position of the baby at birth/ parity, age, occupation and educational level of the mother ($p>0.05$). This result collaborates with a similar study in which estimation of fetal weight using length of femur does not depend on the age, and BMI of the mother, sex of neonate or parit (Firoozadadi *et al* 2007). Growth patterns of the humeral and femur length in a multiethnic population have no difference in birth weights of Indians, Malays and Chinese nor gender or parity (Rama, S. *et al* 1996).In a similar study by Thame *et al (*2006) the result obtained were closely related to present sample results especially when considering the values obtained for maternal age, in which it impact positively on the birth size irrespective of age. Multiplying femur length by seven during the second half of gestation will give a good indication and prediction of total fetal and neonatal growth (Falkner *et al.,* 1987).

In conclusion, the length of femur at birth have no significant effect on the age, educational level occupation of the mother including position and sex of the baby at birth respectively.

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