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Research article

PREDICTION OF WEIGHT OF CHILDREN AGED UP TO TWO YEARS BASED ON FOOT LENGHT IN ETHIOPE EAST LOCAL GOVERNMENT AREA OF DELTA STATE OF SOUTH-SOUTH NIGERIA

Lilian Ebele Chris-ozoko

Department of Human Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, Delta State University Abraka, Nigeria.

Corresponding author email: lilyzoks@yahoo.com

ABSTRACT

Introduction: When a child is in a critical condition, it may not be hundred percent possible to determine the body weight using weighing scale. Under such a condition, paediatricians estimate weight using the age of the child. **Material and Method:** The weight was measured using a weighing scale. In cases where the babies were too small and unable to stand on the weighing scale alone, the mother was weighed alone and while carrying the baby and the weight of the baby was determined by subtracting the weight of the mother from the weight of the mother and the baby. **Results:** Mean weight for male children is 10.98kg, Mean foot length for male children is 5.04 inches, R^2 = 0.61, F statistics = 7.57, Probability = 0.0001531, Standard deviation of weight for males is 5.2, Standard deviation of foot length is 0.009 **Conclusion:** Base on Foot length, weight of children below two years can be predicted in emergency condition.

Keywords: Weight, Foot length, Children

INTRODUCTION

In emergency situations drug dosage is very difficult to calculate for children who are incapacitated, because their weight, surface areas and length which are the present available means of estimating appropriate drug dosages may not be readily assessable. Although early researchers have predicted age-based formulas which were predominantly used for estimation of children's weight under emergency medical treatment.[1] This method of drug dosage estimation is even less specific and hence less accurate than the preceding ones most especially because of the variability of weight of children across different tribe and economic situations.

Haftel et al [2] carry out a study on "hanging leg-weight" method for weight estimation in children. Though the method was not like other work proposed and used before, but could not attract further interest. For obvious reasons

Mathur et al, [3] showed that foot length can be used to predict the gestational age of very premature aborted foetuses.

Bavdekar [4] in India conducted a study on a novel technique using foot-length to predict the

weight of children under the age of 2 years was developed in India.

Foot length measurement is a potential tool for evaluating children with low birth weight. [5]

Embleton et al [6] work on a research study on the relationship between foot length and nasotracheal length. They came out to show that foot length is a reliable predictor of nasotracheal length.

Other researchers (Amamturk et al [7]also conducted a study on the relationship between foot length and body weight in adults age between 17.6 and 82.9 years. And found a significant relationship between both.

The aim of this study therefore, is to establish a relationship between foot length and weight of children below two years in Ethiopia East local Government Area of Delta State; south-south Nigeria.

MATERIAL AND METHOD

Sample size : Sample size of the research study is hundred and ten. Sixty four (64) males and females (46) were included in the present study. All the children used in the study were under two years and their ages ranged from three months to two years. Healthy children without deformity were used after permission was obtained from parents and teachers of sure foundation nursery and primary school, Abraka- Delta State.

Procedure for weight measurement: The weight was measured using a weighing scale. In cases where the babies were too small and unable to stand on the weighing scale alone, the mother was weighed alone and while carrying the baby and the weight of the baby was determined by subtracting the weight of the mother from the weight of the mother and the baby.

Procedure for measurement of foot length: Foot length was measured as a direct distance from the prominent point of the back of the heel to the tip of the hallux or to the tip of the second toe, when the second toe is longer using a vernier calliper.

Statistical analyzing data: The data obtained was analyzed using mean, bar chart, frequency polygon, standard deviation, body mass index, linear regression and correlation analysis. Statistical analysis performed using the ordinary least squares (OLS) technique with its desirable property of the best linear unbiased estimator (BLUES) being adopted.

RESULT

Data analysis : Mean weight for male children is 10.98kg, Mean foot length for male children is 5.04 inches, R^2 = 0.61, F statistics = 7.57, Probability = 0.000153, Standard deviation of weight for males is 5.2, Standard deviation of foot length is 0.009

Table 1: Showing Weight, foot length and Weight Predicted using regression formula for males

Weight	Foot length	Weight predicted using regression formula
8kg	2.05 inches	6kg
9kg	3.83 inches	10kg
9kg	4.46 inches	11kg
14kg	5.72 inches	14.7kg
9kg	6.90 inches	17kg

Table 2: **Summary of Regression Result for Male**

Independent variable	Dependent variable		(Foot length male)	
	Coefficient	Standard Error	t-statistics	Probabilities
Weight	0.07	0.03	2.88	0.01
Constant	77927	6248.207	12.47	0.00

The result in table 4.1 shows that the increase in weight has a linear relationship with the foot length. Thus an increase in weight by a unit will increase the foot length by 0.07 units.

The R^2 is the coefficient of determination and it explains the fitness of the equation. The R^2 suggests that 63 percent of the changes in foot length have been explained by weight. This means that the equation represents a good fit. This is because the unexplained variation is just thirty seven percent (1-063). The R^2 is the adjusted R^2 for degrees of freedom and it suggests that sixty one percent of the changes in foot length have explained by weight.

The F test is used to test the overall significance of the equations. The result showed that the F calculated (7.57) > + critical (2.01) + critical (2.01). This is an indication that weight is significant in explaining the changes in foot length.

R^2 = 0.81, R^{-2}= 0.79, F statistics = 10.67, Probability = 0.000199, Female mean weight is 9.58kg

Female mean foot length is 4.04inches, Standard deviation of weight in females is 3.9, Standard deviation of foot length in females is 0.009

Table 3: Showing Weight, Foot length and Weight Predicted using regression formula for Females

Weight	Foot length	Weight predicted using regression formula
11.5kg	1.09 inches	4kg
5kg	2.37 inches	5kg
7kg	3.67 inches	7.8kg
12kg	4.21 inches	8.6kg
10kg	5.80 inches	11.2kg

Table 4: Summary of Regression Result for Female

Independent variable	Dependent variable		(Foot length male)	
	Coefficient	Standard Error	t-statistics	Probabilities
Weight	0.81	0.05	16.25	0.0000
Constant	2794.7	1183.3	2.36	0.0228

The results in this table suggest that weight has a positive linear relationship with foot length. Thus an increase in the weight by a unit will increase the foot length by 0.81 units. The regression linear equation relating foot length to weight was y = 2.4x + 1 and y = 1.6x + 1.9 for females. The average body mass index for males was 15.70 and for females is 17.28

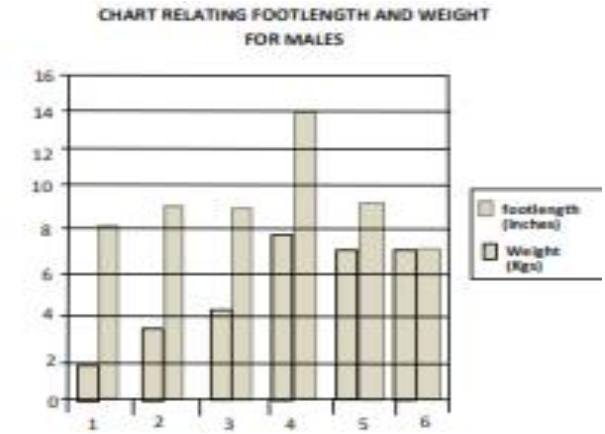

Fig 1: Foot length and weight of Males

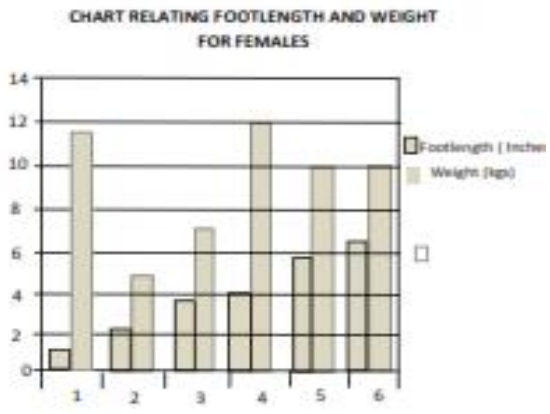

Fig 2: Foot length and weight of Females

DISCUSSION

The finding in this present study shows that the mean weight in males is higher than the mean weight in females, while the mean foot length in males is higher than the mean foot length in females.

Sandeep et al, [8] working with Indian children under two (2) years found a coefficient of determination to be 0.88 while James D.K. et al [9] working in Manchester found a correlation coefficient of 0.95. This work arrived at a correlation coefficient of 0.62 in males and 0.81 in females. This is quite similar to the above finding and suggests that all variability in weight can be explained by a linear regression model.

The average body mass index for females was 17.28 and for males was 15.70, this all falls within the fifth percentile for children under two (2) years which is considered as normal (CDC, 2009). This work also gives a regression line equation for children under two years in Nigeria. It is our hope that other writers will derive equations for other parts of Nigeria since this work x-rays Ethiope East local Government Area of Delta State in South- South Nigeria.

The importance of this study cannot be overemphasized, because it provides the parameters measured for estimation of weight and thereby estimation of dosage of drugs for emergency purposes in health cares. The results have shown some important implications. It showed that both for females and for males, the weight plays significant role in influencing the changes in foot length for both males and females. The result showed that when the weight of the females changes by a unit, the foot length of males increases by 0.86 units. The result also indicates that when the weight of the females changes by a unit, the foot length of males will increase by 0.07 units.

From the equations derived for both males and females, it shows that if any of the variables are known, the other can be determined.

Weight was estimated using the regression equation derived and was compared with the actual weight and they were all within the same range.

CONCLUSION

In conclusion, this study is most useful in emergency cases for determination of weight for calculation of drugs doses especially in rural Nigeria where adequate facilities are not available in our paediatric wards and the age of the child is in doubt.

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