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A Comparative Study On The Cephalic Indices Of Normal Growing Children And Children With Sickle Cell Anaemia In Port Harcourt

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ABSTRACT

A comparative study on cephalic index was carried out on 50 patients, 28 males and 32 females homozygous for sickle cell anaemia, who attended the sickle cell clinic at the University of Port Teaching Hospital between the age ranges of 3-18 years. The same was also done for 250 normal growing children 131 males and 119 females between ages 3-18 years who are pupils of schools within at the University of Port Harcourt as well as First International Academy, Rumuokoro, Port Harcourt. The Head Length (Greatest anteroposterior diameter) was measured with the help of spreading calliper, from glabella to inion. The Head-breadth was measured as the maximum transverse diameter between two fixed points. The results showed a mean cephalic index value of 79.8±4.3 for the normal growing children while that for male sickle cell children was 77.1±3.7 which is significant ($P<0.05$). The mean cephalic index for normal female children was 79.9±3.9 while that for female sickle cell children was 78.4±.8 which is statistically non significant. Thus it has been deduced that sickle cell anaemia has an effect on this anthropometrics index.

Key words: Cephalic, anaemia, measurable, Sexes

Cephalic index is an important anthropometrics index, useful in determining racial variation and sexual differences especially in individuals whose identity are unknown (Shah et al 2004) and therefore plays a significant role in forensic science. Cephalic index is used to measure the size of the head which is done by determining the ratio of the maximum head breadth to the maximum head length (Kelly et al 1999). In a study conducted by Boas, (1899) on cephalic index, he discovered that there was a slight degree of correlation between the length and breadth and a larger degree of variation among different races. A low cephalic index also called dolicocephaly, is often observed in patients with chronic subdural hematomas (Sato et al 1992). It has also been found to be gestational age independent with a more significant variation occurring with advancing gestational age (Shah et al 1990). Sekla et al (2005) hypothesized that cephalic index is inherited in a unitary fashion. There are three classifications of cephalic index which can be used to describe the human head, these include dolicocephacy, mesocephacy and brachycephaly (Golalipour el al 2005).

Investigations carried out on the cephalic index of males and females of Gurung community in Nepal revealed a significant gender difference (Lobo et al 2005). The importance of cephalic index is also recognized in determining the variations in shape of the head and face in newborns (Golalipour el al 2005), head dimensions in fitness (Rajlakshmi et al 2001), effect of climatic stress on head forms (Beals 2005) and the impact of supine sleeping and orthotic treatment of severe brachycephaly (Graham et al 2005).

This study was carried out to investigate the long-term impact of a chronic disability such as sickle cell anaemia on the cephalic index by comparing values of cephalic index of sickle cell anaemia children and that of normal growing children due to the constitutional effect of this disease on growth.

MATERIALS AND METHODS:

The study was carried out on a total number of 300 subjects made up of 50 children (28 males and 32 females) who have been diagnosed as homozygous for sickle cell anaemia at the University of Port Harcourt Teaching Hospital (UPTH) and 250 normal children obtained from the University of Port Harcourt kindergarten, Demonstration Primary and Secondary Schools as well as First International Academy Rumuokoro, Port Harcourt. Their ages range from 3-18. Their cephalic index was obtained by cranial

measurements using Hrdlicka's method. The Head Length (Greatest anteroposterior diameter) was measured with the help of spreading calliper, from Glabella to Inion. The Head-breadth was measured as the maximum transverse diameter between two fixed points. All the measurements were taken with the subject sitting in chair, in relaxed condition and head in anatomical position. For subjects with their hair done were either excluded or had their hair parted before measurement. Measurements were taken to the nearest millimeter and parallax was avoided in the visual read out so as to reduce error in measurements.

Ethical Clearance was sort and obtained from the relevant Institutions and Departments for this study. Consent was also obtained from children or their parents. All data were analyzed statistically.

RESULTS AND DISCUSSIONS

Table 1 below shows the mean, standard error of mean = S.E, and standard derivation = SD, of cephalic index of both sickle cell patients and normal children.

The mean cephalic index of male and female children with sickle cell disease and normal growing children of both sexes were observed. Sickle cell disease children (both male and female) showed statistically significant lower values of cephalic index of 77.1±3.7 versus 79.8±4.3 and 78.4±3.8 versus 79.9±3.9 for males and females respectively.

Table 1: Cephalic indices of investigated subjects

Cephalic index	Sickle cell male	Normal male	Sickle cell female	Normal female
Mean	77.1	79.8	78.4	79.9
S.E	0.69	0.97	0.68	0.55
S.D	3.7	4.3	3.8	

n = number of subjects.

However, there was no significant difference between the cephalic index of sickle cell males and females ($p>0.05$). The cephalic index of normal growing males and females showed a significant difference with the males having a higher value. Despite the significant difference between the cephalic index of normal growing children and children with sickle cell disease, they all have the same head shape, mesochepalic based on Banister's (1995) classification. Our results are similar to those of Imami-Mibodi's study in Quzvin Iran (Imami-Mibodi and Mastri-Frahani 1996) (40% mesocephalic) and of another study in the North of Iran (36.5 to 38.2%) (Golalipour et al 2003). The dominant type of head in this study, did not resemble those reported in Jordaan's (1976) study in South Africa (Brachiocephalic) and in India (Nakashima 1986) (dolicocephalic).

In the present study, it has been shown that as a group, children with sickle cell disease have a cephalic index lesser than the comparable normal controls, indicating the affection of sickle cell anaemia on bones and consequently, growth. Several studies from the United States, Jamaica, Italy and Nigeria have shown that children and adolescents with sickle cell disease have impaired growth as compared to normal controls (OheneFrempong et al 2001). Growth delay starts in early childhood but becomes more apparent during adolescence when the growth spurt of normal children separates them form the patients with sickle cell disease. Delayed skeletal maturation and adolescent growth spurt have also been reported (Singhal et al 1994) The growth deficit tends to be greater in width than in height or length and is more severe in patients with sickle cell anemia (Platt et al 1984).

This could have probably accounted for the lower cephalic index found amongst the sickle cell disease patients since a lower width will result to a lower cephalic index.

Sickle cell disease, a condition present in Nigeria populations and usually considered to be clinically benign. However, there is evidence to indicate that the pathophysiology is variable, ranging from a benign to a relatively severe clinical manifestations (Mukherjee et al 1997). Although it is generally believed that sickle cell disease has an adverse effect upon the physical growth and development.It will be expected that the cephalic

index would show a decreasing treat in sickle cell patients when compared with normal children due its effect on this anthropometric parameters.

CONCLUSION

With the comparison of the mean cephalic index of normal children and sickle cell patients, this study could be subjected to further investigation due to its relevance in forensic science and clinical anthropometry.

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