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Some Morphometric Changes Associated With Sickle Cell Anaemia In Niger-Delta Region Of Nigeria

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ABSTRACT

Some of the long-term complications of sickle cell anaemia are growth retardation and morphometric changes that affect prediction anthropometry. This study on the morphometric changes (head, chest and mid-thigh circumference) was carried out on 40 patients confirmed homozygous for the disease who attend the sickle cell clinic at the University of Port Harcourt Teaching Hospital and 160 normal growing children/adolescent drawn from the university's day care centre, nursery school, and the demonstration primary and secondary school, all aged between 2-18 years. The technique of measurement followed those described by Tanner et al, and using internationally accepted methods in anthropometry. The data obtained were than analyzed statistically. The results shows that values for head circumstance in the sickle cell anaemia patients were generally higher than those for the normal growing children/adolescents. This is probably attributable to the frontal bossing of the skull associated with the disease. Values for the chest circumference showed variations with age due to physiological and pathological changes associated with the disease. mid-thigh circumference values are generally lower for sickle cell anaemia patients in this study.

Key Words: Morphometric changes, Sickle cell.

Sickle cell anaemia is a common genetic disease among the blacks (Schnal and Bens jnr.).(1995) sickle cell trait is said to occur in 8% of black population in the United States (Schnal and Bens jnr.).(1995). it is a genetic condition that results from a point mutation that changes the amino acid at position 6 of the â globulin chain from glutamic acid to valine (Embury 1986); Honig and Adams .(1986).

Hb S (a_2 $\hat{a}_2$) behaves normally in the oxygenated state, but deoxygenated Hb S polymerizes and the homozygous state produces sickle cell anaemia (Lubin and Vichiasky 1991). the physiological consequence of sickling is two fold(Schnal and Bens jnr.).(1995) :

a) Occlusion in the micro-vascular circulation causing ischaemia or infarction of tissues supplied by the occluded vessels. This is the dominant morbidity and mortality (Lubin and Vichiasky 1991).

b) Haemolysis of sickled cells due to membrane damage and fragility of deformed cells.

The above forms the basic pathphysiologic basis of the disease that tend to affect many organ systems of the body, with pronounced effects on the spleen, central nervous system, bones, pulmonary system, skin, haematological system, and the immune system. This great burden of disease tends to affect development both physical and emotional and otherwise, more so when this a disease state that starts to manifest from infancy.

Childhood and adolescence represent a rapid growth period in life and studies abound on the parameters of measuring growth and its relationship with well being (Ogunranti and Didia (1986);Tanner (1981); Tanner and Whitehouse (1976);Morley (1977); Morley (1996); Whitter (1961). These parameters are quite useful in the monitoring growth and well being. Sickle cell anaemia with its multi system effects is bound to have some influence on these parameters of monitoring as has been documented in previous studies. Konotey (1973); Phebus et al (1984); Tanner (1981)

The Niger Delta area of Nigeria, though the source of the mineral wealth of Nigeria, is about the least developed in terms of basic necessities and infrastructures, which include access to education and good health care. Environment is known to affect the pattern and outcome of the sickle cell anaemia (Phebus et al (1984);. We therefore used some morphometric parameters: Head, Chest and Mid-thigh circumference to evaluate the effect, if any, of the sickle cell anaemia on the growth pattern of children/adolescents in the Niger Delta region of Nigeria.

MATERIALS AND METHOD

A total of one hundred and sixty (160) normal children and adolescents, aged between 2-18 years were drawn from the University of Port Harcourt schools: day care centre, nursery, demonstration primary and secondary schools.

Sickle cell anaemia children/adolescent were those diagnosed as being homozygous for Hb S, and were drawn from the sickle cell clinic of the university of port Harcourt were recruited for the study.

Measurements of Head, Chest and Mid-Thigh circumference were taken using the technique described by Tanner et al (Tanner (1981); . a observer errors. The data for the sickle cell anaemia subject and the normal subjects were compared and analyzed statistically.

RESULT

The results are presented in the following tables and figures:

Table 1 shows the mean value of Head circumference for normal and sickle cell anaemia (S.C.A) children/adolescents. Generally the figures obtainable for the S.C.A. group are greater in value than those for normal group. However when subjected to analysis using (ANOVA), these differences are found not to be significant.

Table II shows values for the Mid-Thigh circumference (M.T.C) for both study populations. The values for both groups show a steady increase with age with occasional decrease. However, values for the S.C.A groups are generally lower and this difference is significant statistically when subjected to A.N.O.V.A., with F value of 5.088 at 5% confidence level.

Table III shows values for mean chest circumference in two test populations. Values for the two populations show steady increase with age but with occasional decrease. Values for S.C.A. groups are generally less than those of the normal group. However, the observed differences are not statistically significant.

DISCUSSION

We have compared certain morphometric parameters of normal sickle cell anaemia (SCA) children/adolescents. The values for the two study populations follow the same trend, however, the actual values show some differences. There was an age-associated increase in the mid-thigh, chest and head circumference in both study groups. This trend tends to agree with previous studies (Ogunranti and Didia (1986);Konotey (1973); Tanner (1981);Lesi (1979); Kramer et al (1980). As individuals grow, especially in the children/adolescent age range, there is a concomitant increase in size of the measured parameters. However, when the two populations are compared, it is found that the head circumference values for the SCA group are greater and this is as result of the bossing of the cranial bones resulting from compensatory increased marrow activity (haemopoiesis) Lesi (1979); Kramer et al (1980). The differences noted in this study are, however, not statistically significant. The mean chest circumference for the SCA group is generally lower in value as noted in this study. This could be due to repeated vasculitis in these SCA patients from acute chest syndromes resulting in the lower sizes of intra-thoracic structures, and thus the chest circumference. However, these differences are not statistically significant. The mid-thigh circumference (MTC) also shows that the SCA group have a lower value for every age. These differences are found to be statistically significant, and they tend to result from the generally development associated with the burden of SCA. MTC, like mid-arm circumference, is an important anthropometric measurement index for growth and development (Lesi (1979); Kramer et al (1980).

From the ongoing, it becomes obvious that sicklers do not develop at exactly the same rate as normal children. However, with better Medicare and education, these differences may be minimized.

Table 1: Mean Measurement Of Head Circumference for Normal and SCA Children/Adolescents.

Age (Year)	Normal (CM)	SCA(CM)
2	47.8	49.3
3	51.1	49.4
4	47.1	50.0
5	50.5	52.7
6	51.7	54.7
7	49.4	52.5
8	51.3	50.0
9	51.5	-
10	50.9	55.0
11	52.8	53.8
12	51.9	53.3
13	53.2	53.9
14	52.5	-
15	56.7	53.8
16	55.8	56.5
17	55.8	54.8

Table II: Mean Values for Mid-Thigh Circumference for Normal and SCA Children/Adolescents.

Age (Year)	Normal (CM)	SCA (CM)
2	27.10	26.30
3	30.50	26.70
4	30.60	28.20
5	31.10	27.50
6	33.80	32.00
7	33.90	31.50
8	35.30	31.00
9	36.00	-
10	36.70	34.00
11	38.50	35.00
12	40.70	34.50
13	38.10	36.50
14	38.20	28.00
15	46.30	38.00
16	46.50	42.50
17	-	-

Table III: Mean Chest Circumference for Normal and .SCA Children/Adolescents

Age (Year)	Normal (CM)	SCA(CM)
2	49.5	48.5
3	50.5	50.2
4	54.2	52.2
5	53.8	57.5
6	58.3	63.8
7	56.3	53.8
8	58.8	55.0
9	59.9	-
10	60.7	58.5
11	65.9	62.5
12	66.4	64.1
13	68.5	69.8
14	63.3	-
15	65.4	72.5
16	75.0	74.5
17	80.8	76.0

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