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Morphometry of Sphenoidal and Maxillary Sinuses in Sickle Cell Anaemia Subjects in Port Harcourt: A Radiological Study.

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ABSTRACT

Sickle cell anaemia (SCA) subjects have been widely reported to present with various anthropometric deficits compared to their unaffected counterparts. This prospective comparative anatomo-radiological study was carried out to determine whether there are differences in the morphometry of the sphenoid and maxillary sinuses between SCA and non-SCA (control) subjects, and also the standard values of the sphenoid and maxillary sinuses of SCA subjects in Port Harcourt. Plain radiographs of the paranasal sinuses (occipitofrontal, occipitomental and lateral views) of 129 non-SCA subjects (72 males and 57 females) sourced from the film library of 3 different hospitals, and 34 SCA subjects (24 males and 10 females) were exposed at the Radiology Department of the University of Port Harcourt teaching hospital (UPTH). Following ethical clearance, the radiological dimensions of the sphenoid sinus (height, HTS and anteroposterior length, APS), the maxillary sinus (height, HTM, anteroposterior length, APM, right width, WDRM and left width, WDLM) were measured using a millimeter rule. The data were analysed using Z-test. The mean value for the height of sphenoid sinus for non- SCA and SCA males, were 15.08±3.50 and 16.42± 4.92. it was observed that there were no significant differences between the height of sphenoid sinus for non- SCA and SCA males(P0.05). The mean value for the height of sphenoid sinus for non- SCA and SCA females males, were 16.02± 4.42 and 15.90+ 4.43. It was also observed that there were no significant differences between the height of sphenoid sinus for non- SCA and SCA females (P0.05). The mean value for the height of maxillary sinus for non-SCA and SCA males, were 28.15± 7.12 and 29.08±7.48. It was observed that there were no significant differences between the height of maxillary sinus for non- SCA and SCA males (P0.05). The mean value for the height of maxillary sinus for non- SCA and SCA females males, were 29.09±6.95 and 28.60±10.57. It was also observed that there were no significant differences between the height of maxillary sinus for non- SCA and SCA females (P0.05). It was also observed in this study, that there were no significant differences between the maxillary sinus width of the sickle cell anaemia subjects and the normal subjects (P0.05). However the mean values of the dimensions of the maxillary sinus was higher in the SCA subjects. This study has provided reference data for the sphenoid sinus and maxillary sinus morphometry of sickle cell anaemia subjects.

Key Words: Sickle Cell Anaemia (SCA), anthropometry, radiology, Paranasal Sinuses.

INTRODUCTION

Sinuses are air containing cavities situated in the frontal, ethmoidal and sphenoid bones of the cranium and the maxillary ones of the face[1]. They are known as the paranasal sinuses because of their formation from the nasal mucosa and their continued communication with nasal fossas. Rapid growth occurs in childhood and adolescence, and numerous studies have been carried out on various parameters by measuring growth and its relationship with well- being. It has been reported that sickle cell anaemia produces stunted growth which usually begins in the second half of the first decade of life and that affected children present with subnormal weight and height[2].Many factors are known to influence the manifestations of sickle cell anaemia, among which are nutritional factors Ekeke[3] and environmental factors like pollution, poor sanitary conditions and personal hygiene and other poor social circumstance[4]. West et al[5] assessed the radiological changes in the chest and soft tissues in 7 SCA patients at the university of port Harcourt teaching hospital. The radiographs showed hepatomegaly and plethoric lung field. Interest in skull and other bone lesions associated with severe anemia was stimulated in 1925 when Cooley and Lee[6] described striking radiographic abnormalities in the bones of children with the disease then known as “Mediterranean anaemia” and later identified as “Cooley' anaemia” and 'thalassaemia major”. The calvaria lesions described included widened diploe, thinning of the external table, increased radiolucency, and vertical trabecular striations. Cooley et al.[7] later reported similar but less strike lesions in patients with sickle cell anaemia. Since that time, there have been numerous reports of radiographic abnormalities and anatomic lesions in the skulls of patients with sickle cell hemoglobinopathies. Gnathopathy, skull bossing, finger- clubbing and lymphadenopathy are common presentations in Africans with SCD[8].

Brown and Sebes[9] found the maxillary protrusion to be due to an increase in the mean angle. However it has been suggested that gnathopathy is most likely a combination of both maxillary prominence and a degree of mandibular retrognathism.

Scan et al.[10] studied the age related changes of maxillary air sinus from its anteroposterior, transverse and vertical dimensions using computerized tomographic. Licciardello et, al.[11] carried out a cephalometric analysis to evaluate the craniofacial morphology of 37 caucasian patient with sickle cell disease. Their lateral skull radiographs were measured and compared with that of 36 normal subjects without any recognizable haematological rotation of the mandible and a tendency towards a vertical pattern, with lower and total face heights increased in comparison with a significantly greater maxillary incisor proclination in all the patients was reported than in the control group. As compared with black American patients, the craniofacial abnormalities observed in the Sickle cell patients were of moderate severity. A comparative study on canthal and cephalic indices was carried out by Fawehinmi and Ligha[12] and 100 patient, 54 males and 46 females between the age range of 3-18 years who were homozygous for SCA and 500 normal growing children, 291 males and 209 females 3-18years were used. The mean canthal index for healthy children was 35.16+0.01 as against 87.28+1.65 for the sickle cell children, which is statistically significant.

Fawehinmi and Ligha[13] reported the following findings after conducting a research on SCA children in Port Harcourt. Mean; values for nasal index were lower in the SCA children than their non-SCA counterparts, although not statistically significant, showing a tendency towards more platyrrhine noses. The Mean values of subnasale to gnathion distance were also higher in SCA children but also not statistically significant, showing a tendency towards maxillary prognathism

Kim[14] carried out a morphological survey of the frontal and maxillary sinuses in koreans in order to gather standard values of the size of the normal frontal and maxillary sinuses. Generally, in their study, the size of the frontal and maxillary sinuses in men was greater than in women.

Arije et al[15] of the Nagasaki university school of Dentistry, Japan, carried out study to ascertain the normal range of the the maxillary and its changes with age on computed tomography in 107 subjects. The means transverse and anteroposterior widths of the normal adult maxillary sinuses were 2.70+ 0.60cm ad 3.56+47cm, repectively.

Despite the importance of knowledge of the sphenoid and maxillary sinuses of the Sickle cell subjects, there is scarcity of literatures concerning these two sinuses of sickle cell subjects. This is the driving force behind this research. This research is therefore carried out to determine if there are differences in the morphometry of the sphenoid and maxillary sinuses between SCA and normal growing children. Also to determine standard values for the dimensions of the sphenoid and maxillary sinuses of SCA patients using radiographic films of their skull. These values can be useful in clinical practice and forensic anthropology.

MATERIALS AND METHODS

The study was carried out in the Radiology Department of the UPTH, in collaboration with the Department of Paediatrics and Child Health. 29 sickle cell anaemia children, of both sexes, and between the ages of 4-20 were mobilised for this study with their informed consent.

- Plain x-rays of their paranasal sinuses were taken in three different standard projections: occipitofrontal, occipitomental (open-mouthed), and lateral projection.
- 129 radiographs of the paranasal sinuses of non-sicklers, with no known pathologies affecting the bones of their skull were obtained and used as control. They were sourced from the Radiology Departments of the UPTH, Braithwaite Memorial Specialist Hospital and First Rivers Hospital all in Rivers State.
- The radiographs were placed on the fluorescent viewing box to distinguish the right from the left sides, especially in the open-mouthed Waters view for the maxillary sinus.
- With the aid of a sharp pencil and a square, the outermost points of the superior, inferior and two sides of all the paranasal sinuses, demonstrated from the three different views were joined together, forming a rectangle in the process from which the various measurements were taken.

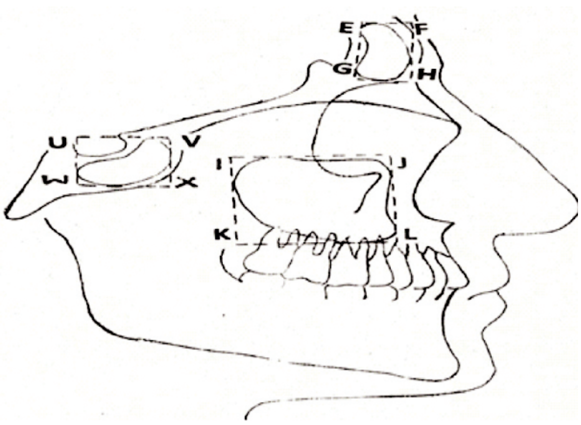

Figure 1: Sinus Measurements Depicted on Lateral Projection.
IK = JL = Height of Maxillary Sinus: The maxillary sinus height was measured from the point I to K using lateral projection.

- IJ = KL = Width of Maxillary Sinus: The maxillary width was measured from the point K to L , using lateral projection.
- UV = WX = Anteroposterior Dimension (Width) of Sphenoid Sinus was measured from the point U to V. Using lateral projection.
- UW =VX = Height of Sphenoid was measured from the point U to W, using lateral projection.

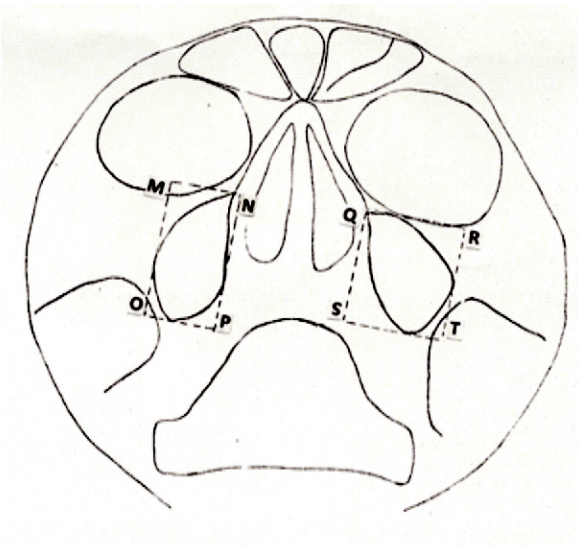

Figure3: Sinus Measurements Depicted on Occipitomental Projection
MN = OP = Mediolateral Dimension (Width) of Right Maxillary Sinus
QR = ST = Mediolateral Dimension (Width) of Left Maxillary Sinus

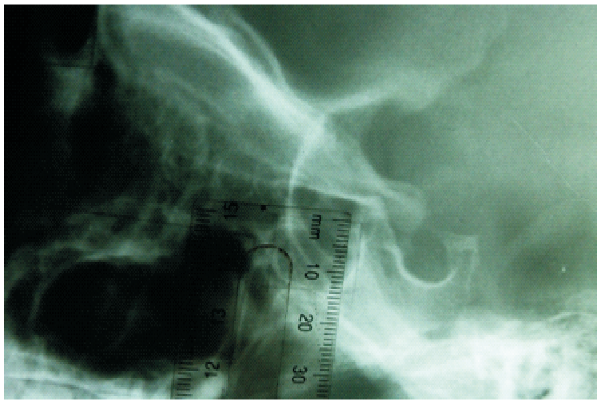

Figure 2: Photoplate Showing Sphenoid Sinus Height Measurement

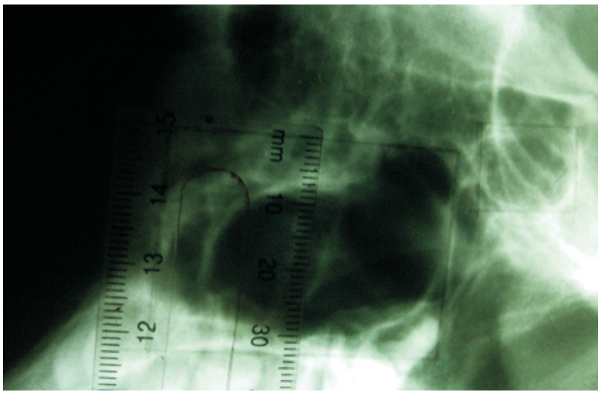

Figure4: Photoplate Showing Maxillary Height Measurement

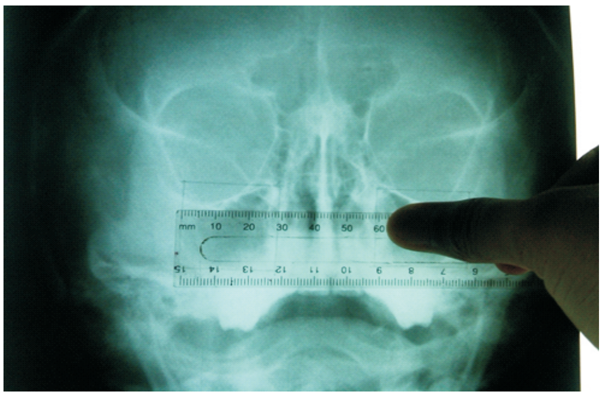

Figure 5: Photoplate Showing Measurement of Width of the Right Maxillary Sinus.

- Measurements were taken with a ruler to the nearest millimetre. The measurements were taken twice to ensure accuracy and parallax was avoided in the visual readout of values.
- Ethical consideration was sought and obtained from the Ethics Committee of UPTH.

Analysis of Data

The data was analyzed using Z-test to check statistical significance and (p 0.05) was taken as statistically significant.

Difficulties Encountered/Limitation of Study

- For a human study like our own, it was difficult to source the sickle cell anaemia patients from the clinics and later mobilize them for x-ray.
- It was quite tasking to get the cooperation of many of the female SCA due to their artificial hair which grossly interfere with the clarity of the radiographs and makes it difficult to visualize these sinuses.

RESULTS

The results of the mean and standard deviation of the height of the sphenoid sinus (HTS), anteroposterior length of the sphenoid sinus (APS), height of the maxillary sinus (HTM), anteroposterior length of the maxillary sinus (APM), width of the right maxillary sinus (WDRM), for non-SCA and SCA subjects are represented in tables 1 and table 2. The mean height of the sphenoid sinus for non-SCA male subjects as 15.0.8±3.50. Mean height of sphenoid sinus for male SCA subjects was 16.42±4.92. The difference between them was not statistically significant ($p>0.05$). Mean height of sphenoid sinus for non SCA female subjects, and subjects with SCA were 16.02±4.42 and 15.90± 4.43 respectively. The difference between them was not also statistically significant ($p>0.05$). Values for mean anteroposterior dimension of the sphenoid sinus for non-SCA male and subjects with SCA in this study were gotten as 14.45±4.17 and 13.58±.3.58 respectively. The difference between them was not statistically significant ($p>0.05$). For non-SCA females, the mean anteroposterior length of the sphenoid sinus was 15.54± 5.00, while that of the SCA females was 13.40± 2.76.There was also no significant differences (p0.05). The mean height of the maxillary sinus for non-SCA and male subjects as 28.15±17.12; for male SCA subjects, 29.08±7.48, and the difference between them was not statistically significant ($p>0.05$).

For females, the mean height of the maxillary sinus for the non- SCA ones was 29.09±6.95, while that for the SCA one was 28.60±10.57. The difference between them; was not statistically significant too ($p>0.05$).

The mean anteroposterior length of the maxillary sinus for non-SCA male subjects was 32.75±7.23; and 33.79±0.08 for male SCA subjects, the difference between them was not statistically significant ($p>0.05$). For the females, the mean anteroposterior length of the maxillary sinus for the non- SCA ones was 33.07± 7.51, while that for the SCA one was 33.60±11.19. The difference between them was also not statistically significant ($p>0.05$).

The mean width of the right maxillary sinus for male non –SCA and male SCA subjects were gotten as 20.90±4.19 respectively. The difference between them was no statistically significant ($p>0.05$). For non SCA female subjects, the mean width of the right maxillary sinus was 20.58±4.00, while that for the SCA subjects was 21.88±3.64 respectively. The difference between them was not statistically significant ($p>0.05$). For non- SCA female subjects, the mean width of the left maxillary sinus was 21.35±4.02, while that for the SCA female subjects was 22.30±5.03; the difference between them was not statistically significant ($p>0.05$).

Table 3, shows the Mean Height and Anteroposterior Length of Sphenoid Sinus against Age for Normal-Growing Male Subjects, and Male Subjects with SCA. Table 4 shows the Mean Height and Anteroposterior length of Sphenoid Sinus (mm) against age (years) for Non-SCA and SCA Female Subjects. Table 5 shows the Mean Height and Anteroposterior length of Maxillary Sinus (mm) against age (years) for Non-SCA and SCA Male Subjects. Table6 shows Mean Height and Anteroposterior length of Maxillary Sinus (mm) against age (years) for Non-SCA and SCA female Subjects. There were variation in these parameters with respect to age. Figure7 shows the Mean Height of Sphenoid Sinus against Age for Normal-Growing Female Subjects and Female Subjects with SCA. Figure8 shows the Mean Width of Right Maxillary Sinus against Age for Normal-Growing Male Subjects and Male Subjects with SCA. There were variation in these parameters with respect to age.

Table 1: Z-Test Result for the Maxillary and Sphenoid Sinus Variables (Mm) Compared Between Non- SCA and SCA Subjects.

PARAMETER	NON-SCA MALE	SCA MALE	P VALUE	RESULT
Mean WDLM	21.48	21.88		
SD	3.85	3.64		
Sample size	72	24	P> 0.05	No. Sig. Diff.
PARAMETER	**NON-SCA FEMALE**	**SCA FEMALE**	**P VALUE**	**RESULT**
Mean WDLM	21.35	21.92		
SD	4.02	5.03		
Sample size	57	10	P> 0.05	No.Sig. Diff.
WDLM: Mean Width Of Left Maxillary Sinus				
PARAMETER	**NON-SCA MALE**	**SCA MALE**	**P VALUE**	**RESULT**
Mean HTS	15.08	16.42		
SD	3.50	4.92		
Sample size	72	24	P> 0.05	No.Sig. Diff.
PARAMETER	**NON-SCA FEMALE**	**SCA FEMALE**	**P VALUE**	**RESULT**
Mean	16.02	15.90		
SD	4.42	4.43		
Sample size	57	10	P> 0.05	No.Sig. Diff.
HTS: Height of Sphenoid Sinus				
PARAMETER	**NON-SCA FEMALE**	**SCA FEMALE**	**P VALUE**	**RESULT**
Mean APS	15.54	13.40		
SD	5.00	2.76		
Sample size	57	10	P> 0.05	No. Sig. Diff.

Table 2: Results of Sphenoid and Maxillary Sinuses.

PARAMETER	NON-SCA MALE	SCA MALE	P VALUE	RESULT
Mean APM	32.75	33.79		
SD	7.23	8.08		
Sample size	72	24	P> 0.05	No. Sig. Diff.
PARAMETER	**NON-SCA FEMALE**	**SCA FEMALE**	**P VALUE**	**RESULT**
Mean APM	33.07	36.60		
SD	7.51	11.19		
Sample size	57	10	P> 0.05	No.Sig. Diff.
WDRM: Mean Width Of Right Maxillary Sinus				
PARAMETER	**NON-SCA MALE**	**SCA MALE**	**P VALUE**	**RESULT**
Mean WDRM	20.90	21.71		
SD	3.85	4.19		
Sample size	72	24	P> 0.05	No.Sig. Diff.
PARAMETER	**NON-SCA FEMALE**	**SCA FEMALE**	**P VALUE**	**RESULT**
Mean WDRM	20.58	21.90		
SD	4.00	5.59		
Sample size	57	10	P> 0.05	No.Sig. Diff.
WDRM:Mean width of right maxillary Sinus				

Table2: Mean Height and Anteroposterior Length of Sphenoid Sinus (mm) against Age (years) for Non-SCA and SCA Male Subjects

AGE	MEAN HEIGHT OF SPHENIOD SINUS			MEAN AP LENGTH OF SPHENOID SINUS
	SCA	NON-SCA	SCA	NON-SCA
4	14.00	9.60	14.00	9.60
5	11.33	10	11.67	10.00
6	14.00	11.40	11.00	11.20
7	9.50	13.00	8.00	11.80
8	17.50	16.00	15.00	11.60
9	19.50	15.00	13.50	12.40
10	18. 67	15.00	1600	14.25
11	14.33	14.50	12.67	14.17
12	-	14.67	-	15.00
13	-	14.00	-	12.50
14	14.50	18.50	12.00	19.50
15	30.00	19.00	20.00	16.33
16	23.00	19.00	17.00	21.00
17	-	19.50		19.75
18	-	18.75	-	20.50
19	19.00	18.25	-	18.50
20	-	15.80		15.20

Table 3: Mean Height and Anteroposterior Length of Sphenoid Sinus (mm) against Age (years) for Non-SCA and SCA Female Subjects

AGE	MEAN HEIGHT OF SPHENIOD SINUS		MEAN AP LENGTH OF SPHENOID SINUS	
	SCA	NON-SCA	SCA	NON-SCA
4	13.00	11.00	10.00	10.00
5	11.00	10.25	-	11.00
6	19.00	9.75	12.00	9.25
7	-	11.67	12.00	11.00
8	15.00	18.67	-	15.33
9	20.00	20.25	14.00	17.00
10	-	13.33	15.00	13.00
11	13.00	-	-	-
12	-	16.00	14.00	15.33
13	-	16.00	-	12.33
14	-	19.67	-	24.00
15	-	20.00	-	18.00
16	22.00	18.75	17.00	18.00
17	-	2.00	-	17.00
18	-	18.43	-	20.57
19	22.00	17.60	18.00	17.40
20	-	18.50	-	19.00

Table 4: Mean Height and Anteroposterior Length of Maxillary Sinus (mm) against Age (years) for Non-SCA and SCA Male Subjects

AGE	MEAN HEIGHT OF MAX. SINUS		MEAN AP LENGTH OF MAX.SINUS		MEAN WIDTH OF RIGHT MAX.SINUS		MEAN WIDTH OF LEFT MAX.SINUS	
	SCA	NON-SCA	SCA	NON-SCA	SCA	NON-SCA	SCA	NON -SCA
4	15.00	20.20	16.00	22.20	15.00	15.20	16.00	16.00
5	22.67	18.40	23.00	32.00	15.67	15.20	16.67	15.80
6	26.00	19.80	24.00	24.60	23.00	15.20	22.00	15.80
7	20.00	20.60	28.00	25.20	22.50	17.00	22.00	17.60
8	28.00	23.00	36.00	27.40	21.00	21.80	22.00	20.80
9	27.25	30.40	37.50	33.60	21.25	21.40	21.75	22.00
10	31.33	29.25	34.00	36.50	21.00	21.00	22.00	21.75
11	37.00	29.17	38.67	35.71	26.33	21.83	26.00	22.50
12	-	29.67	-	35.67	-	23.57	-	25.00
13	-	26.00	-	29.50	-	21.00	-	22.50
14	32.00	30.50	38.50	35.75	23.50	23.25	22.00	24.75
15	38.00	30.33	41.00	34.00	26.00	25.33	25.00	25.33
16	37.00	31.00	41.00	36.67	23.00	24.00	23.00	24.00
17	-	34.75	-	39.00	-	25.00	-	25.50
18	-	37.75	-	42.25	-	23.00	-	24.75
19	40.00	37.75	47.00	41.75	26.00	23.75	26.00	24.25
20	-	37.60	-	42.80	-	24.80	-	24.60

Table 5: Mean Height and Anteroposterior Length of Maxillary Sinus (mm) against Age (years) for Non-SCA and SCA female Subjects.

AGE	MEAN HEIGHT OF MAX. SINUS		MEAN AP LENGTH OF MAX.SINUS		MEAN WIDTH OF RIGHT MAX.SINUS		MEAN WIDTH OF LEFT MAX.SINUS	
	SCA	NON-SCA	SCA	NON-SCA	SCA	NON-SCA	SCA	NON -SCA
4	18.00	21.00	21.50	22.00	15.50	13.80	15.00	14.80
5	-	20.50	-	26.75	-	15.75	-	16.00
6	21.00	19.50	24.50	24.50	21.50	16.00	22.50	16.25
7	22.00	21.33	29.00	25.33	19.00	15.33	20.00	16.00
8	-	27.67	-	30.00	-	19.33	-	21.67
9	25.00	29.00	34.00	31.75	23.00	21.75	25.00	23.25
10	21.00	27.67	48.00	34.00	30.00	22.00	30.00	24.00
11	-	-	-	-	-	-	-	-
12	28.00	30.67	41.00	31.57	19.00	25.00	22.00	24.00
13	-	27.67	-	30.33	-	22.00	-	22.33
14	-	32.67	-	38.67	-	21.67	-	23.67
15	-	30.50	-	33.50	-	22.50	-	23.50
16	36.00	29.50	40.00	33.50	22.00	21.25	29.00	22.25
17	-	30.00	-	37.00	-	24.50	-	23.00
18	-	37.71	-	41.86	-	24.43	-	25.14
19	46.00	38.80	52.00	42.80	32.00	23.20	29.00	23.80
20	-	42.00	-	45.50	-	24.00	-	24.50

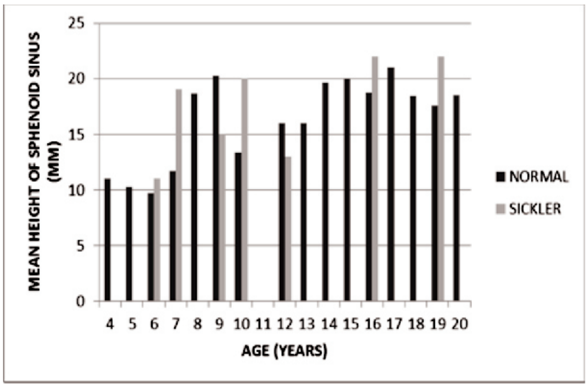

Figure7: Mean Height of Sphenoid Sinus against Age for Normal-Growing Female Subjects and Female Subjects with SCA

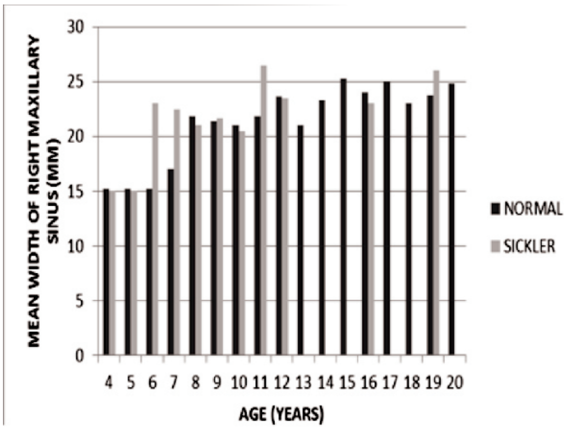

Figure8: Mean Width of Right Maxillary Sinus against Age for Normal-Growing Male Subjects and Male Subjects with SCA

DISCUSSION

Anthropometry has become an important tool in the study of genetic conditions, particularly as a diagnostic aid for the clinical geneticist. It can be applied as a means of identifying and classifying a syndrome. Continued cooperation among physicians, geneticists and anthropologists for the collection and assessment of patient and normative data is essential if these goals are to be realized[16]. Scan et al[10] studied the age related changes of maxillary air sinus from its anteroposterior, transverse and vertical dimensions using computerized tomographic.The study was done to find out the average maximum dimensions (anteroposterior, transverse and vertical) of maxillary air sinus in males and females using CT scan and study the age related changes of maxillary sinus with these dimensions. In their study, there was gradual increase in all the 3 dimensions from age group zero to 25 years. Our result is in line with this, as there were age related changes in the maxillary sinus with respect to age. Samih et al.[17] conducted research on computerized tomography morphometric analysis of the sphenoid sinus and related structures in sudanese population. A number of 201 normal patients 54.2% (109) were males and 45.8% (92) were females, with age range between 18-90 years old were used for this study. They worked on the Correlation between sphenoid sinus morphology, gender and age. They observed that there was a strong positive corelation between these parameters. Our study study did not look at the correlation , but there was a relationship between these parameters based on the graphs in our result. Sevinc et al[18] studied the anatomic variations of sphenoid sinus pneumatization in a sample of turkish population. MRI was used for the study.The aim of their study was to evaluate the incidence of anatomic variations of the sphenoid sinus in a Turkish population sample. Sagittal T1-weighed spin-echo Magnetic Resonance Images (MRIs) of the paranasal sinuses of 616 adult individuals (406 women, 210 men) aged between 25-89 years (50.4 17.4) were analyzed retrospectively using DicomWorks v3.1.5 software. In their study, the most common type of the sphenoid sinus was the sellar type (83%; n=511) for the whole study group. Our study did not looked at the variations in sphenoid sinuses, but it determined whether there are differences in the morphometry of the sphenoid and maxillary sinuses between Sickle cell anaemia SCA and non-sickle cell anaemia SCA (control) subjects, and also established standard values of the paranasal sinuses of SCA subjects in Port Harcourt.

Oredugba and Savage[19] carried out an anthropometric study on some Nigeria children with SCD and reported the following findings. A higher proportion of control (93%) had a normal facial profile; compared with SCD; subjects (79%). The SCD; subjects showed a higher prevalence of maxillary prognathism (21%) than control (40%). This is not in line with our result. The results of this study showed no statistically significant difference at 95% confidence level, between SCA and non-SCA (control) subjects in all the measured parameters. This may be attributed to the fact that subjects used for this study, were regular visitors of the SCA clinic of the department of paediatrics and child health of the UPTH and received proper medical attention and expert advice from the physicians. Our result, when compared with Keats and Sistrum[20], shows that there were ethnic and racial differences in the morphology of the maxillary and sphenoid sinuses.

Although there was no statistically significant difference between the SCA and non-SCA subjects, the mean values of the dimensions of the maxillary sinus was generally higher in the SCA subjects reflecting an increase in the size of these sinuses. This is in agreement with the findings of Cooley and Lee[6] which all confirmed diploetic expansion of the skull, initially occurring in the frontal area, leading to frontal busting, later followed by expansion in the parietal area.

The increase in the dimensions of the maxillary sinus agrees with the findings of Oredugba and Savage[19, 8, 9] which showed that there is increased maxillary prognathism in SCA. It is also in consonance with the report of Fawehinmi and Ligha[13] on subnasale-to –gnathion distance on maxillary prognathism in sickle cell anaemia children. These increases in the dimensions of the paranasal sinuses are likely to account for the facial changes responsible for the sickle cell facie. Because of these increases, there is likelihood of a higher incidence of bony fractures to these areas of the face following trauma. This increase may also account for a possible reduction in the incidence of infections of these sinuses as a result of better drainage, due to correspondingly enlarged Ostia.Extramedullary haematopoiesis (EH) may occur more frequently in sickle cell patients than is reported and may be misdiagnosed as sinusitis[21]. Initially, EH is microscopic and clinically silent but may stimulate the production of enough cells to cause organomegaly and tumor-like masses with symptoms associated with the organ or system involved.

CONCLUSION

Knowledge of the mophormetry of the sphenoid and maxillary sinuses cannot be overemphasized. This study has provided a data base for the measured parameters for sickle cell anaemia and non-sickle cell anaemia subjects. Knowledge gained from this study will be useful to the radiologist, clinician, anatomist and forensic scientist. This study should also be carried out in other parts of the country, so that, we can have a data base for these sinuses that will represent our country, Nigeria.

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