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Anthropometrical Study Of The Sella Turcica In A Nigerian Population

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ABSTRACT

Anthropometrical data related to the length and depths of the sella turcica without any pathological defect were measured. The subject sampled included 527 Igbos and 459 Yorubas. The pooled samples (986 cases) have the mean value of 6.86 ± 1.21mm, for depth and 11.97 ± 1.56mm, for length. The mean length of the Sella turcica was 10.92 ± 1.56mm for the Igbos and 11.10 ± 1.47mm for the Yorubas. The mean depth of the Sella turcica for the Igbos was 5.52 ± 0.89mm, and 6.96 ± 1.38 for Yorubas ($P<0.05$). the dimensions were significantly higher in the Yorubas. The regression equation of the straight line that passes through a significantly correlated distribution is Depth $= 0.6737$ x Age ± 670803, length $= 0.10922$ x Age ± 9.58621. The correlation coefficient is significant at $P=0.005$. in clinical practice increase or decrease in size of the sella turcica are manifestation of several diseases. The values obtained from the samples were relatively smaller than the Caucasian values (Camp 1923).

Keywords: Sella Turcica, length, depth, pituitary tumour.

The proportions of anthropometrical measurements obtained in its broad perspective describes the variation of human species in anatomical terms. It describes human variation between race as well as between individuals on the basis of age, sex and family, pathological and environmental factors. Racial variations are recognized as a result of the evolutionary process; mutations that are inheritable are acted upon by natural selection. Hence racial differences thus reflect current environment pressure, genetic drift and the present hybridization between geographical distinct species or types and the present selection adaptation of human variation to their environment.

The Sella turcica varies considerably in size and shape (Hamilton, 1987). According to Clucton et al (1982) the normal range of the Sella turcica varies between 11-16mm in length and 8-12mm i.e. routine bilateral x-ray film of skull. The value of the upper limit of the normal size has been largely subjective. The Sella turcica is one focal point where a diagnosis of raise intracranial pressure is made, hence the range of normal appearance in our race is of considerable importance.

The first description of the radiograph showing changes in the Sella turcica produced by a pituitary tumor is attributed to Openhenim

made before the Society for Psychiatry and Nervous diseases in Berlin on the 13th November 1889. Since then radiographic size of the Sella turcica has been the subject of many studies, the oldest being that of Cushing in 1921, Camp (1923, 1924) measured the anteroposterior diameter (length) and the depth of the Sella turcica on the lateral view of the skull x-ray.

According to the illustrated Encyclopedia of Human Anatomic variation: opus V: Skeletal system (1992) it quotes that: "Eggerman and Inke (1963) cited by Long (1983) reported these values for the Sella turcica: depth was 8mm with a range of 4 to 12mm, the average depth of 6.85 in Europids, 7.03mm in Mongoloids, and 6.93mm in Nigrids. The average length of the Sella was reported as 10.5mm with a range of 5-15mm and an average width of 14mm with a range of 10-16mm.

Familiarity with radiological anatomy of the Sella turcica is important because any change in its usual shape offers a clue to the condition of the pituitary gland and the presence of turmors. Early diagnosis by mere inspection of the x-ray will go a long way in saving lives that would otherwise have been lost. It will also assist in assessment of growth and development and in evaluation of the nutritional status of the population.

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MATERIALS AND METHODS

A total of 986 (527 males and 459 females) radiographs of skull lateral view (downs view) were collected, from the following centres: Ebonyi State University Teaching Hospital, Abakaliki,; Federal Medical Centre, Abakaliki,; Eastern Medical Centre, Enugu,; Okitipupa General Hospital Okitipupa,; General Hospital Ondo,; X-ray Centre Ayo Val-Ondo,; Ondo State Specialist Hospital Akure,; Central X-ray Clinic Abakaliki.

Although the samples of radiograph used were collected from different places (Centres/Hospitals), the Focus Film Distance (FFD) used was 90cm as indicated from Centre/Hospitals where the samples were collected. This introduces an enlargement factor of about 15.8% by induction Hass Factor (Hass 1952).

Samples of radiographs measured were only skull that fulfilled the following conditions. No pathological conditions might have affected the measured areas or the sella, and when pathological conditions were evident, the sella turcica was not affected, all cases of raised intracranial pressure from radiologist reports were not measured, obviously abnormal sella turcica size were excluded, in addition to the radiographs employed in the study other materials used for the study includes and X-ray illuminator, a pencil and metric rule.

Measurement Techniques

The length (L) and the Depth (D) was measured in the sagittal plane from the margin of the tuberculum sellae to the dorsum sellae. This was so because the sella turcica is limited anteriorly by tuberculum selae and bounded posteriorly by the dorsum selae. Its length therefore extends from the tuberculum selae to the dorsum selae Hamilton (1982), Clucton et al (1982).

In measuring the depth of the sella turcica, anthropologists used the distance from the posterior clinoid process to be base of the fossa. This is according to Camp (1923) the posterior clinoid process, which are two tubercules at the superior angles of he dorsum selae, further deepens the sella turcica. The posterior clinoid process also appears in the X-ray films at the superior angles of the dorsum sellae. So a true depth of the fossa will be perpendicular (straight line) in the line drawn from the posterior clinoid process to the base of the fossa and this was adopted in this study.

RESULT

Of the 986 radiograph measured, 527 were Igbos and 459 were Yorubas. The mean length for the Igbos was 10.92 ± 1.56mm and Yorubas 11.02 ± 1.47mm (F = 1 á, = 0.05) (see Table 1.). On the average the length of Yorubas was significantly higher than that of the Igbos. For the depth distribution, Igbos had a mean of 5.52 ± 0.89mm and Yorubas, 6.96 ± 1.38mm. However, these values were not significant. (F = 1, á = 0.05).

Table 1: Shows the class set, mean, standard deviation and comparison of the length distribution between the Yoruba and Igbo (pooled).

Class	7 – 10	11 – 14	15 -	Mean	SD	Comparison
	No/%	No/%	No/%			
I	214(54)	303(52)	10(83)	10.916	1.5589	S
Y	182(46	275(48)	2(17)	11.015	1.4686	S
Total	396(40)	578(59)	12(1)	11.965	1.558	S

F = 1 α = 0.05

In Comparison, the distribution of length for Igbos and Yorubas were 10.916 ± 1.558 and 11.015 ± 1.468 respectively. It is discovered that there is significant difference between the distributions of length at á = 0.05.

Table 2: Shows the class set, mean, standard deviation and comparison of the length distribution between the Yorubas and Igbos pooled

Class	3 – 5 No/%	6 – 8 No/%	9 – No/%	Mean	SD	Comparison
I	287(76)	235(45)	5(6)	5.516	0.8934	NS
Y	92(24)	288(55)	79(94)	6.962	1.3785	NS
Total	379(38)	523(53)	84(9)	6.859	1.213	NS

$$F = 1 \quad \alpha = 0.05$$

Comparing the depth distribution of the pooled sample for Igbos 5.516 ± 0.8934 and Yorubas 6.962 ± 1.3785. It is discovered that there is no significant difference between the distributions of depth of Sella turcica at 0.05 level of significance.

Table 3: Showing correlation variables (Age depth and length) for the pooled samples

Correlations	Age	Depth	Length
Age	1.0000	0.5928	0.6521
Depth	0.5928	1.0000	0.7886
Length	0.6521	0.7886	1.0000

$$P = 0.001$$

Correlation is significant. Thus multiply regression is calculated. The following regression equation is gotten for the whole sample.

Depth = 0.6737 x Age + 6.70803
Length = 0.10922 x Age + 9.58621

DISCUSSION

The normal dimensions of the Sella turcica in Igbos were measured. These values were subjected to test of comparison within the tribes in addition to providing standard regression equations for variables. (i.e. Depth and length) of the Sella turcica.

This present work based on two ethnic groups in Nigerian population has mean value of 6.86 ± 1.21mm, for depth and 11.97 ± 1.56mm for length. The mean value of the length and depth of the Sella turcica in the Igbos were respectively 10.92 ± 1.56mm and 5.52 ± 0.89mm. The mean value of the length and depth for the Yorubas were respectively 11.02 ± 1.47mm and 6.96 ± 1.38mm, there is no significant difference (f = 1, 0 < = 0.05) between the Igbos and Yorubas in depth of the Sella turcica, while there is significant difference in length (Tables 1 and 2). The mean value of the length of the Sella turcica in the Caucasians was 12.5mm while the depth has a mean value of 8.1mm (Camp. (1923). The above implication is that the Sella turcica of this study group has a smaller dimension in the overall assessment. It will be of note that what may seem as abnormally big Sella for the Nigerian (Negroes) might be normal for the Caucasians. This suggests a racial or environmental difference in the dimensions of the Sella turcica. This study shows some degree of positive correlation between the age subject and dimensions of the length and depth of the Sella turcica. This implies that the length and depth appears to grow in slight proportion in age, confirming the research of Silverman (1957).

Hass (1952) held the view that skull attains its maximum growth at the age of 20 years; other researchers have indicated growth in the Sella turcica up to the age of 25 years (Camp. (1923). There may be slight growth of the Sella turcica above 40 years.

Hence ages below 40 years could be substituted in a regression equation to estimate other variables.

Many studies done show that nutrition deficiencies delay growth (Syles and Freeds

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1972). An increase diet brings about increase in calcium absorption (Braithwate (1976). Calcium is a major consituent in bone formation; it is required in the zone of calcification. Although genetic factors affects the rate of bone growth formation, pucarreli (1980) observed under certain experimental conditions nutritional factors stimulate cranial differentiation to an extent greater than that brought about by genetically controlled factors.

With new innovation brought about by science and technology and increase in standard of living, size of the sella turcica in the tribes has indeed increased over the years due to general increase in growths.

This present study established a good correlation when all the samples are pooled together between subject Depth versus age, and length versus age using Pearson's 2 tailed correlation showed a significant correlation (P = 0.001) for the sample.

The business of the regressional line is trying to define the equation of the straight line that passes through a significantly correlated distribution equation that best fit a significantly correlated distribution for the samples is given as follows:

Depth=0.673 x Age + 6.70803
Length=0.10922 x Age + 9.5361.

In the above equations the age is the independent variable. If known it could be used to estimate the dependent variable. The intercept of the age in graph is not a natural principle.

REFERENCES
Braith Waite J D (1978). Increased protein diet brings about increased calcium absorption. The British J. Nutrition, (No.) 3, 505-507.

Camp J D (1923). Normal and Pathological anatomy of the sella turcica as revealed at necropsy. Radiology, 1: 65.

Camp J D (1924). Normal and Pathological anatomy of the sella turcica as revealed by pentgenograms. Am. J. of Roent 12: 143-155.

Cluton L A, Dorst P, Garn S M (1982). The volume of the sella turcica in children. New standard: Am. J. Roent Vol. 1 Pg. 40: 797-801.

Cushing H (1912). The pituitary bodies and its disorders, Philadelphia, Lippikn cott.

Hamilton W J (1982). Textbook of human anatomy, 2nd edition. Macmillan publishers Ltd. 75: 76.

Hass L L (1952). Roentgenological skill measurement and diagnostic application. An. J. Roent; 67: 177.

Pucciurelli H M (1980). The influence of experimentation on deformation of cramo facial development in rats Am. J. Phys. Anthrop. 43: 455 -462.

Ronaud A R, Adel K A, Ryosoke M. (2002). Illustrated Encyclopedia of Human Anatomy Vorutox Sella Turcica.

Silverman F N (1957). Roentgen standard size of the pituitary fosse from infancy through adolescent Am. J. Roent; 78: 457.

Sykes and Freeds (1972). Quoted by Braith Waite, G.D., Brit. J. Nutrition 40 (No. 31) 505-507.