AGE DEPENDANT SOMATOMETRIC AND CEPHALOMETRIC VARIABLES AMONG NIGERIANS.

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ABSTRACT
Background: The process of growth passes through stages of developmental processes. This stage is
the age. Age is known to affect many parameters in the body and this includes
somatometric and cephalometric variables.
Methods: The study was conducted with a total number of 409 students of university of Jos, St Murumba and School of Higher Islamic Secondary School Jos. The following cephalometric and somatometric parameters were measured viz; Age, Weight, Height, Head width, Bizygomatic distance, Upper facial height, Outer canthal distance, Palpebral fissure length,Exaphthalmometric value, Ear width, Nose width were measured.
Result: This study showed a positive relationship between age and weight, height, outer canthal distance, papebral fissure length, exophthalmometric value, nose width, bizygomatic distance (p 0.01) and head width (p 0.05). But it showed a negative significant relationship with ear width and upper facial length (p 0.01).
Conclusion: It is concluded that the interrelation of age and the above studied somatometric and cephalometric parameters may give an understanding of craniofacial development and congenital anomalies.

Key words: Age, Somatometric, Cephalometric.

INTRODUCTION

Cephalometric, a branch of anthropometry (division of physical anthropology) describes measurements of head and face in cadeveric, living, or radiological specimens.
Sexual and racial differences in cranium have been widely studied[1]where it was first suggested that skull measurement could illuminate the natural relationship among apes, Negroes and Europeans. Extensive literature was reviewed[2,3] which also provided most extensive statistical data and assessed which cranial variation exhibit racial (and sometimes sexual) correlation.
The relationship of measurements to each other is expected to be constant at specific ages. These proportions and relationship change dramatically from the fetal period, though childhood to adolescence because of various interactions between genetic, biochemical and environmental factors.
Coordinated postnatal growth of calvarias and facial skeleton proceeds at different rate and periods. The cranial cavity being related to cerebral growth, the facial skeleton is related to the development of teeth, muscles of mastication and tongue. The anterior part of cranial base is a zone of interaction between facial cerebral growths[4,5,6].
In another fetuses linear measurements of width, length and height of the face and cranium were made on sixty fetuses of 49-212mm crown rump length. Measurements of relative growth rates showed an increase in cranial length more than height, than width and facial greater than width[7].
The aim of this paper is to find proportionate growth and development and estimate cephalometric and somatometric values for Nigerians. Therefore the importance of this paper in the application of clinical specialties such as plastic and oral surgery concerned with cranio-facial deformity cannot be overemphasized.

MATERIAL AND METHODS

This study was carried out in Jos, the capital of Plateau state, Nigeria in the year 2001, which has been described as the melting pot of Nigeria. This is because of the conglomeration of the various ethnic groups of Nigeria due to its temperate like whether. The subjects where students of University of Jos, St Murumba and School of Higher Islamic Secondary School Jos..
Instruments used included weighing balance (Essential China), measuring tape, sliding and

spreading calipers and transparent graded meter rule.
Cramo-facial measurements were recorded with the subjects sitting in upright position
Frankfurt's horizontal position see figures attached.
Head width (HW) (fig. 1) is the maximum biparietal diameter
Bizygomatic distance (BZD) (fig.2) is the maximal distance between the most lateral
points of the zygomatic arches (zygion).
Upper facial height (nasal height)(UFH) (fig.3) this is the distance from the root of the
nose (nasion) to the base of the nose (sub nasion)
Outer canthal distance (OCD) (fig.4) is the distance between the outer canthi of the two eyes.
Palpebral fissure length (PFL) (fig.5) is the distance between the inner and outer canthi
Exophthalmometric value (EV) (fig6) is a measure of the normal protrusion of an eye. Ear width (EW) (fig.7), is the width of the external ear (pinna).
Nose width (NW) (fig.8), is the distance between the alae of the two nostrils.

RESULTS

The descriptive statistics of the parameters is shown in the table 1.

Table 1 Descriptive statistics of cephalometric and somatometric values

(measurements are in mm)

	N	I Min.	I Max.	I Mean	Std.deviation
Age	409	12yrs	36yrs	20.9853 yrs	3.7963
Weight	409	26kg	111 kg	58.7995 kg	10.401
Height	409	12.5m	1.92m	1.6796m	8.70E-02
OCD	409	15	140	112.702	1.0025
PFL	409	30	85	36.868	0.4 783
EV	409	40	90	50.775	0.5647
NW	409	25	60	40.377	0.05493
BZD	409	41	209	122.496	1.1650
HW	409	125	196	153.242	0.7402
EW	409	15	50	35.007	0.5842
UFH	409	40	110	60.137	0.7468

From table l,the age range of the subjects is 12-36yrs with mean of20.99yrs+/-3.8SD.
The weight range is 31-111kg with mean of 58.7995kg+/-10.40SD. The height range is 1.36-1.92m with mean of 1.6796m+/-8.7SD. The mean cephalometric variables are,
outer canthal distance is 112.7mm+/-1.00SD; palbebral fissure length is 36.9mm+/ 0.49SD; exophthalmometric value is 50.8mm+/-0.55SD;nose width 40.4mm+/0.055; bizygomatic distance is 122.5mm+/-1.17SD;head width is 153.2mm+/-0.74SD;ear width is 35.0mm+/-0.58SD and upper facial height is 60.1mm+/-0.75SD.
From the table 2 age has a positive correlation at O.Olevel (2-tailed) with
(a) Outer canthal distance
(b) Palbebral fissure length (left)
(c) Exophthamometric value (left)
(d) Nose width
(e) Bizygomatic distance
(t) Weight
(g) Height

Age has a positive correlation at 0.05 (2-tailed) width
(a) Head width

Age has negative correlation at 0.01 (2-tailed) width
(a) Ear width (left)
(b) Upper facial height

Table 2 Correlation of age and the cephalometric and somatometric values.

OCD

Age I Pearson correlation	10.273					
Significance I 0 (2-tailed)		0	0	0	0.049	0
N (total)	1409	409	409	409	409	409

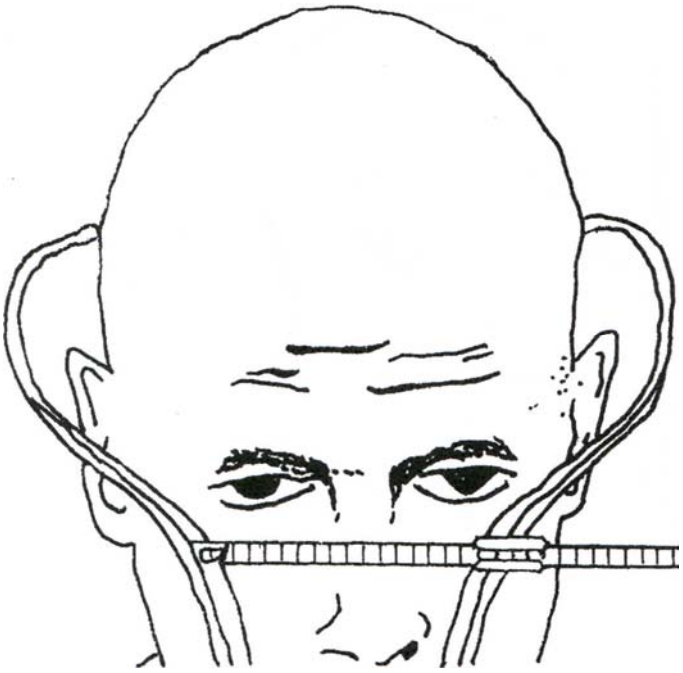
Table 3,Percentage of adult facial and cranial dimensions achieved at different age levels.
(a) Cranium of adult dimensions

CRANIUM OF ADULT DIMENSIONS				
AGE IN YRS	WIDTH	HEIGHT	LENGTH	BIZYGOMATIC WIDTH
0				56
2	86	92	86	80
6	92	96	90	83
12	98	99	96	90
18	100	100	100	100

(b) Face of adult dimensions.

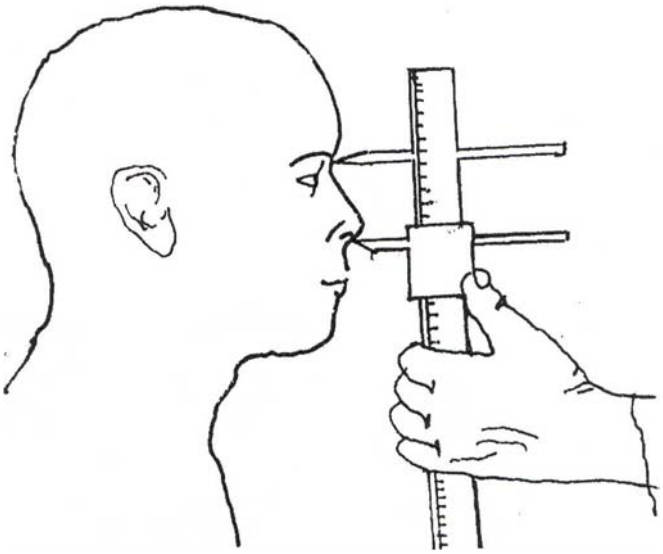
BIGONIAL WIDTH	HEIGHT	LENGTH	VOLUME RATIO CRANIUM: FACE
	38	40	8:1
		70	5:1
83	80	80	3:1
93	89	87	2.5:1
100	100	98	2:1

FIG. 1



Head Width: - is the maximal biparietal diameter.
Land marks: - measure between the most lateral points of the parietal bones (eurion) on each of the head.
Instrument: -Wide Spreading calipers.

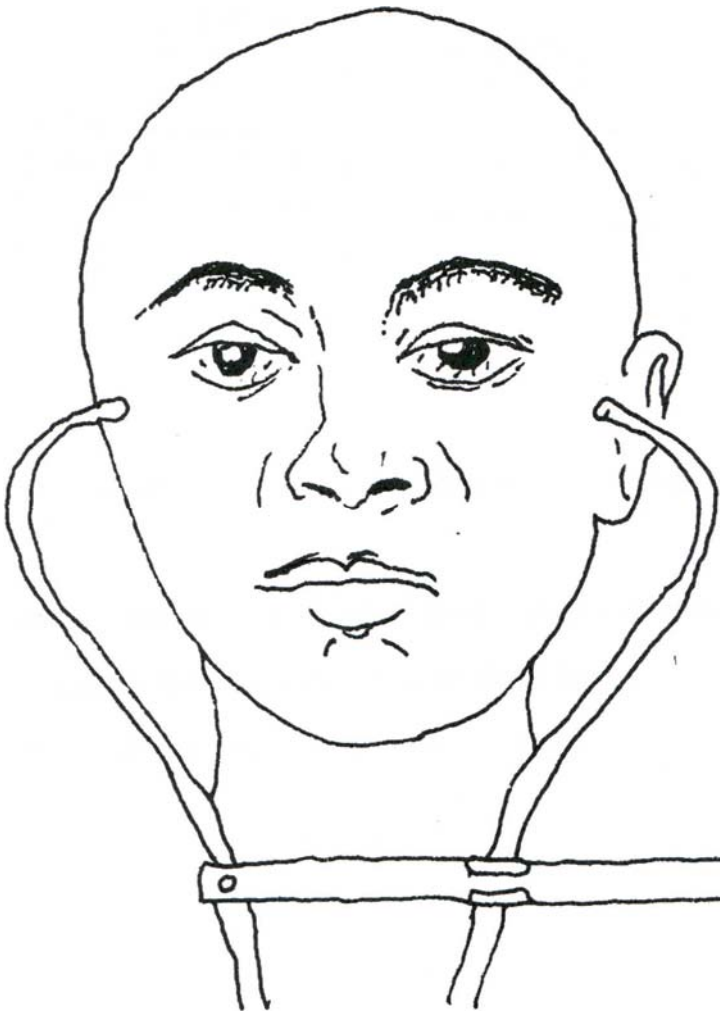
FIG 2



Upper facial height (Nasal length): - this is the distance from the root of the nose (nasion) to the base of the nose (sub nasion)
Landmarks: - measure from the deepest part of the nasal root to the deepest point of

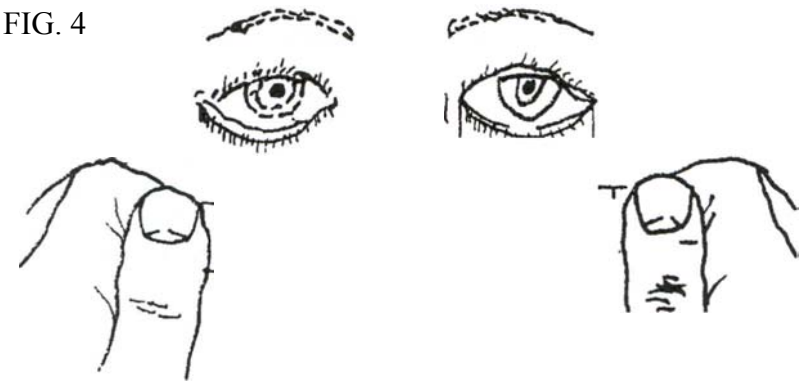
concavity at the base of the nose (sub nasion) in a vertical plane. Instrument: - Sliding calipers.

FIG. 3



Bizygomatic Distance: - (Facial Width): - is the maximal distance between the most lateral points of the zygomatic arches (zygion)
Land marks: - measure between the most lateral point of the zygomatic arches (zygion) localized by palpation.
Instruments: - Wide spreading calipers.

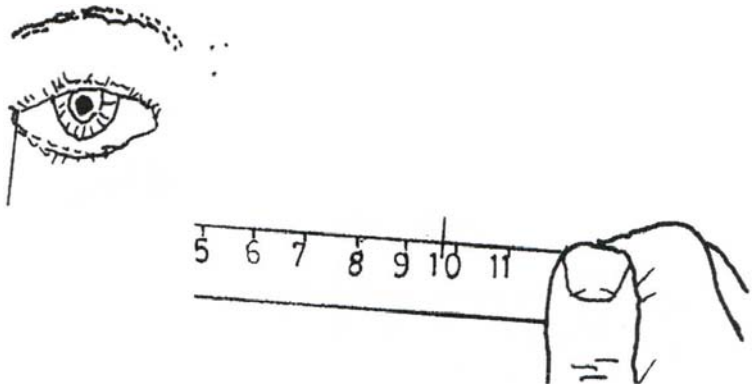
FIG. 4



Outer canthal distance: - is the distance between outer canthi of the two

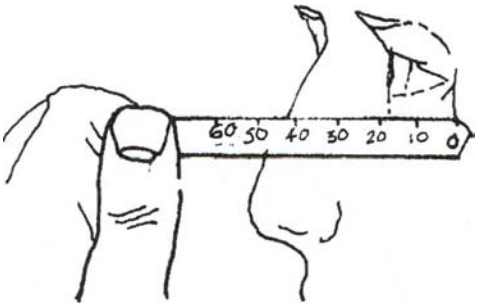
eyes.
Landmarks: - measure from the most lateral comer of one eye to the most lateral comer of the other eye in a straight line.
Instrument: - A graduated transparent ruler.

FIG. 5



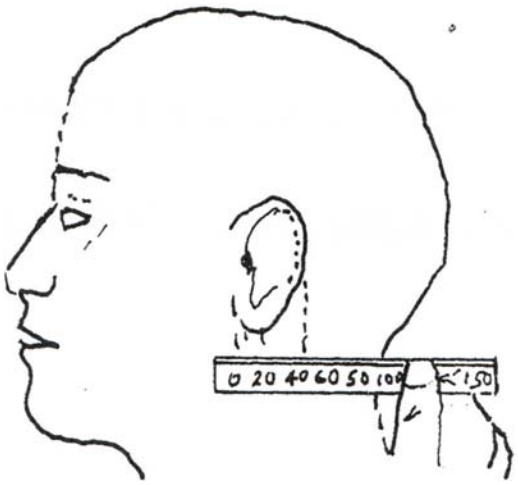
Palpebral fissure length: - is the distance between the inner and outer canthi of the eye.
Landmarks: - measure from the inner to the outer canthi of a particular eye (Right and Left)
Instrument: - A graduated transparent ruler.

FIG. 6



Exophthalmometric value: - is a measure of the normal protrusion of an eye. Landmarks: - measure from the lateral orbital rim of a particular eye to the level of the anterior aspect of that eye in a Frankfurt's horizontal position. Instrument: - A graduated transparent ruler.

FIG. 7



Ear Width: - is the width of the external ear (pinna)
Landmarks: - measure transversely from the anterior base of the tragus to the margin of the helical rim at the widest point.
Instrument: - A graduated transparent ruler.

DISCUSSION

For age, as it increases the following cephalometric and somatometric parameters increase more significantly, that is outer canthal distance, palpebral fissure length (left), exophthalmometric value (left) nose width, bizygomatic distance, weight and height (p value O.Ol) than head width (p-value 0.05). But as age increases, ear width (left) and upper facial height decreases (p-value 0.01).

The proportional growth in percentage of adult and cranial dimensions achieved at different age has been shown, table 3 (8).

This agrees with the findings in the above studies especially as it relates with head width and bizygomatic distance in the different age groups thus

Face[8].

and some of these cephalometric parameters. The facial phenotype of fifty-five Europeans aged between 9months and 35 years with Smith- Magenis Syndrome was studied using previously published methodology[9], they found the facial phenotype of SMS to be distinctive even in the young child. The overall face shape is broad and square, the brows are heavy, with excessive lateral extension of the eyebrows. The eyes slant upwards and appear close set and deep set. The nose has a depressed root and the young child a scooped bridge. Craniofacial widths are greater than corresponding depth and heights. Nasal height is reduced with nasal width increased.

There is mild brachycephaly. The most marked age related changes are increased width of the nose and lower face with reduction in nasal height and mid-facial depths[10].

In a related study[11] carried out to compare cranio- facial morphology in a 2 month old un-operated infant with unilateral cleft lip and palate, the following cranio facial morphologic fmdings were obtained. Markedly increased width of the maxilla, short mandible and bi-maxillary retrognatism except for the premaxillary area, which was relatively protruding and asymmetrical. Depending on the severity, clefts can cause immediate feeding difficulties and later disturbances of speech, hearing, dento facial development and facial appearance. This stigma in turn may predispose to difficulties in social integration and psychological development[12].

It is therefore concluded that the interrelation of age and the above studied somatometric and cephalometric parameters may give an understanding of craniofacial development and congenital anomalies.

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In other studies c

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