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SOMATOTYPE DISTRIBUTION OF SCHOOLCHILDREN IN PORT-HARCOURT METROPOLIS, NIGERIA.

Leko Bankole Japhet (PhD)[1], Christopher Chiedozie.Mbadugha (PhD)[2], Oladipo Gabriel Sunday (PhD)[3],
[1]Department of Anatomy, University of Medical Sciences Ondo, Ondo state.
[2]Department of Anatomy, University of Uyo, Akwa Ibom State.
[3]Department of Anatomy, University of Port-Harcourt, Rivers State
Corresponding author: Leko Bankole, Department of Anatomy, University of Medical Sciences Ondo, Ondo state. Email: bleko@unimed.edu.ng

ABSTRACT

This cross-sectional study involved one thousand school children aged 7 to 18 years in Port-Harcourt, Rivers State. Anthropometric variables including; height, weight, girths, bone breadths and skinfold thickness were measured and blood pressure recorded. The Heath-Carter somatotype and body size expressed in kg/m^2 were obtained. Data was analysed using SPSS version 21 and XLSTAT statistical software. Results indicated the mean ages as; 12.2±2.52, 12.6±2.58, 12.4±2.56 in males, females and the entire sample respectively. Mean BMI were; 18.24±3.24, 17.64±3.12 and 18.73±3.26 for the entire sample, males and females respectively. Females were significantly taller and heavier, with significantly higher BMI than males ($p<0.05$).Males had relatively higher values than females for somatotype variables, except for endomorphy whereas female showed a significantly higher values in all skinfold thicknesses than males ($p<0.05$). The mean somatotype were; 1.7-4.1-3.5, 2.8-3.9-3.1 for males and females respectively, indicating that males lie within the ectomorphic-mesomorph while females were in the balanced mesomorphy categories. This study might represent the first documented report on the somatotype distribution for children and adolescent in the south-south region of Nigeria with particular reference to children and adolescents in Port-Hacourt.

Key words: somatotype, anthropometry
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INTRODUCTION

Somatotype is a concept of physique classification based on a quantitative, height-independent description of the configuration and constituents of the human physique introduced by William Sheldon (1940). Sheldon was the first to introduce the concept of somatotype to provide a more detailed taxonomy of the human physique. He described the human physique as a function of three components using an anthroposcopic method that involves the sorting and scaling of several thousand standardized photographs(taking different views-front ,side and rear views) of four thousands young college men by visual inspection. Sheldon and his co-authors published this work in a book; "The varieties of Human physique" (Sheldon *et al*., 1940). They introduced the use of the word "somatotype' for the description of human physique and the names of three components of physique; "Endomorphy", "Mesomorphy", and "Ectomorphy". Sheldon made ratings of these components on a 7-point scale. He also maintained that the components were derived from the three primitive germ layers of the human embryo and that somatotype was permanent in nature, that is, it is a morphogenotype. In furtherance of his work on describing the human physique, Sheldon with his co-worker wrote several books including; 'The varieties of Temperaments" Sheldon and Stevens (1942); "The varieties of Deliquent

Youth" by Sheldon in collaboration with Hartl and McDermott in 1949 and In 1954, Sheldon published along with Dupertius and McDermott, the book titled 'The Atlas of Man" which was a classical work in which they presented the different types of human physiques. This book then was used as a reference material for somatotyping and it reflected Sheldon's sheer determination in describing by a constitutional approach, the permanent nature of somatotype. Sheldon's concept of physique having three components was an innovative approach distinct from the traditional placement of human physique into few categories.

Although Sheldon's work served as the foundational framework for categorisation of somatotype, most of his contemporaries were opposed to his work. Firstly, he was criticised for maintaining that somatotype was a permanent morphogenotype when the popular views of human biologists and others of his days was that somatotype is a morphophenotype that could change. Secondly, he maintained a closed scale ratings for somatotype in which 7 was considered the highest value for any component and a value of 1 as the lowest. This was seen as too rigid. Thirdly, his method was queried for lack of objectivity in the rating, as his ratings for somatotype were done from his personal judgement based on the photographs of the subjects taken. A modification to Sheldon's work has resulted into the development of a more universal method called the Heath-Carter method which is now used for describing the human physique and accounts for the objectivity in rating of the somatotype.

Somatotyping gives an overall summary of the physique of an individual as a unified whole. It is applied in the field of human biology to study changes in human morphological features which occur during growth and maturation, to provide a good understanding of alterations in health status of both the young and elderly (Heath and Carter, 1971, Robeto *et al*, 1996; Guar and Singh,1997; Panasiuk and Izaak,2000; Kornienko *et al,* 2003; Malik and Ghosh, 2004;Tambovtseva and Zhukova,2005; Kalichman and Kobyliansky, 2006). It is regarded as a good descriptive and classification system for learning about relative shapes and structural components of the human body and variations in samples or populations.

MATERIALS AND METHODS

Study Location: The study was carried out in Port-Harcourt metropolis (an urban area which consists of the Port-Harcourt city within Port-Harcourt local government area itself and parts of Obio-Akpor accordingly) (Ogbonna *et al.,* 2007), the state capital and largest city of Rivers State in Nigeria.

Study Design: The study was conducted as a descriptive cross-sectional survey on children and adolescents drawn from primary and secondary schools within Port-Harcourt Metropolis

Sample Size Determination

The sample size was determined using Fischer's formula for infinite or large population (>10,000)

Sample proportion (S_p)

S_p = Working population in Port-Harcourt / Total population of Adolescents in Port-Harcourt

= 363,691.812 / 1,829,307.48 = 0.198≈0.20

Applying Cochran (1963) sample size (SS) determination formulae;

$$SS = \frac{Z^2 \times p \times q}{d^2}$$

(Cohran, 1963; Yamane,1967)

Where; z =critical value of 1.96, p= 0.20 (estimated proportion of working population in Port-Harcourt)
q = 1- p
d = 0 .03 (tolerance level of 0.05 was adjusted)
Therefore, Sample size (SS) = $\frac{1.96^2 \times 0.20 \times 0.80}{0.03^2}$ = 682.95
10% attrition rate of the sample size determined was added = 0.1 x 682.95=68.30
Total minimum sample size = 682.95+ 68.30 =856.41, approximately 751.

Sampling Technique: The children and adolescents were selected by randomized sampling method.

Subjects Selection

The subjects selected were drawn from both pubic primary and secondary schools within Port-Harcourt. The number of schools were purposively selected. Fifteen schools were chosen all located in the urban area of Port-Harcourt. Each subject, within each randomly selected class in these schools, was selected by random sampling, from the ages of 7 to 18 according to different classes where each age group is found. The date of birth of each subject was obtained by oral interview of the subject and was checked against the school's register and with the parental consent form that was administered to those in primary schools. The ages were calculated as decimal ages based on their date of birth expressed in day, month and year to the test date for which they were measured.

Ethical Consideration

This was ensured to be in line with principle that governs the study of Human subjects internationally. The study was formally approved by the University of Port-Harcourt Research and Ethics committee with an assigned reference number; UPH/CEREMAD/REC/04. Also, permission was also sought from the administrative Heads at the various schools contacted by the presentation of a formal letter of introduction to these institutions. These letters were duly signed as written informed consent received from the school's principals for the study to be carried out. In addition to this, a written parental consent form was distributed to the subjects particularly in the primary schools which was intended for obtaining both consent and accurate reporting on the age for each subject from their parents .The opt-out method was used mainly for those in secondary schools who were considered to be more matured to understand the ethics of the research after a brief explanation was made on the purpose and procedures involved in the study to the students. This method was considered for the purpose of having a high response rate as suggested by some authors (Hewson and Haines, 2006).The confidentiality of each subject was strictly adhered to, such that obtained data on each subject was not in any way disclosed to others.

Inclusion Criteria

The following considerations were made to determine the eligibility of those to participate in the research; subjects must be within the ages of 7 to 18 years; subjects that consented to the study, subjects must be physically healthy, without any overt abnormality that could interfere with body parts intended for measurement and only schools that gave permission for the study were considered.

Exclusion criteria

The exclusion criteria adopted in the study are as following:

(i) Those whose ages fell outside the age range limits chosen for the study

(ii) Those who refused to be recruited into the study

(iii) Those who have some form of overt abnormalities in body parts that could interfere with measurements to be made on the body

Equipment used for Measurements: These included; a height-weight series weighing machine, of the floortype model RGZ-160(made in china), used for both weight and height measurements, slimguide skinfold calliper (creative health product, Made in Plymouth, Michighan, USA), digital bone calliper for the bone breadths (stainless steel, made in china),a fibre-glass non-strechable tape for girths measurements.

Anthropometric Variables Measured

The measured variables included; Height (in cm), Weight (in kg); biepicondylar humerus and femur breadths (in cm), skinfolds (triceps, subscapular, suprailiac and medial calf) measured in mm (nearest 0.5mm), arm flexed and tensed, and medial calf circumferences, measured in to the nearest 0.1cm.

Measurement Protocols

The procedures for taking the measurement were in accordance with the recommendation of the International society for advancement in Kinanthropometry (ISAK).These are stated out for the different variables measured as follows:

Weight: The body weight was measured by means of the floor type weighing machine.The subjects in minimal clothing and bare-footed, were made to stand erect on the centre of the scale platform. Body weight was then measured and recorded to the nearest 0.1kg.

Height: Each subject's height was measured in meters using the anthropometer rod of height scale on the height and weight series machine. Each subject was asked to stand straight with the back against the anthropometer rod of the height scale. The head of the subject is positioned in the Frankfurt plane, as each subject was instructed and then asked to take a deep breath and hold briefly their full breath before being measured immediately. At this state of taking in maximum breadth, the head rest of the anthropometer rod is then lowered to allow it touch the vertex firmly but without extreme pressure being exerted. At this point of the head rest, the height reading on the anthropometer rod of the height scale is observed and recorded to the nearest 0.1cm.

Triceps skinfold: The slimguide caliper was used in taking all skinfold measurements. All skinfold measurements were taken on the right side and to the nearest 0.5mm. The site for the triceps skinfold was first identified by locating the midpoint at the posterior arm between the most lateral part of the acromion and the proximal and lateral border of the head of the radius (the acromiale-radiale distance) while the subject stands relaxed, with the arms hanging loosely sideways. The raised skinfold at this point, held between the thumb and the index finger is then measured with the skinfold caliper, which is placed at a point 1cm below the raised skinfold. Readings on the caliper is noted and recorded to the nearest 0.5mm.

Subscapular skinfold: Each subject was asked to stand in a relaxed manner, arms hanging by the sides of the body. This skinfold is located about 2cm below the inferior angle of the scapular. This fold naturally runs along the natural skin cleavage line obliquely downwards and laterally at 45^0.

Supraspinale skinfold(originally called suprailiac skinfold): With each subject standing in a relaxed position, this skinnfold is located as a raised fold of skin determined by the natural fold of skin that runs downward and anteriorly or inwards at 45^0. This fold can lie between 5-7cm above the anterior superior iliac spine.

Medial Calf skinfold: Each subject was asked to sit on a chair to have the knee at right angle, the calf being relaxed, in order to locate this skinfold as a parallel raised fold of skin at the level of the maximum girth on the medial aspect of the calf.

Biepicondylar Humerus breadth: The digital bone caliper (steel type, made in China) was used for the measurement of both bone breadths. Each subject was asked to raise his/her arm anteriorly to the horizontal plane and flex the elbow at 90^0. The bone calliper is then carefully and firmly applied to both epicondyles of the right humerus and the reading on the screen of the calliper recorded to the nearest 0.01mm.

Biepicondylar Femur breadth: This is done while the subject seats in a relaxed manner and the knee is bent at right angle (that is, the leg is flexed at the knee and at right angle to the thigh).The maximum distance between the medial and lateral epicondyles of the femur is then measured using the digital calliper to the nearest 0.01mm.

Flexed and tensed Arm girth: A fibreglass tape, as the recommended substitute for the Lufkin preferred steel tape by ISAK (2001) was used for this measurement. The arm flexed and tensed circumference or girth was measured after each subject was asked to hold the right upperlimb horizontally and then flexed the elbow at 45^0, clenching the hand to maximally contract the elbow flexors. The tape is then placed at the already marked midpoint of arm and made to encircle the flexed arm. The zero mark on the tape was made to lie below the point at which measured value is read off the tape, to the nearest 0.1cm.

Standing Calf girth: Each subject is made to stand with feet slightly apart. The tape is then placed horizontally around the calf ad the maximum calf girth is measured to the nearest 0.1cm.

Somatotype Estimation

Each subject’s somatotype was estimated using a specialised software (somatoype v.1.2, 2002, Sweat Technologies).This software developed by Sweat Technologies was recommended by The author of the Heath-Carter method of somatotype calculation, as it takes into account the entire ten anthropometric variables,that is; height,weight, skinfolds (triceps, subscapular, supraspinal, and medial calf), circumferences (tensed arm, calf), and biepicondylar diamaters (humerus and femur) that are employed in the algorithms(equation) proposed by Heath-Carter(1990) for calculating the somatotype as summarized below:

Endomorphy = - 0.7182 + 0.1451 (ΣX) - 0.00068 ($ΣX^2$) + 0.0000014 ($ΣX^3$)
Mesomorphy = (0.858 HB + 0.601 FB +0.188 AG + 0.161 CG) - (0.131 H) + 4.5
Ectomorphy:
If IPI $\geq$ 40.75, then Ectomorphy = 0.732 IPI - 28.58
If IPI < 40.75 but > 38.25, then Ectomorphy = 0.463 IPI- 17.63
If IPI $\leq$ 38.25, then Ectomorphy = 0.1
Where: ΣX = (sum of triceps, subscapular and supraspinale skinfolds) multiplied by (170.18/height in cm); HB = humerus breadth; FB = femur breadth; AG = corrected arm girth; CG = corrected calf girth; H = height; IPI, the inverse of the ponderal index, is given by: height / cube root of weight.
AG and CG are the girths corrected for the triceps and calf skinfolds respectively as follows: corrected AG = flexed arm girth - triceps skinfold/10; corrected CG = maximal calf girth - calf skinfold/10.
For comparative analysis of the gestalt somatotype, ?
Several suggestions have been made by different authors on comparison of the mean somatotype among different groups, either the t-test for two groups or the F-test for two or more groups can be used (Carter *et al.,*1983; Cressie *et al.,*1986). However, Carter *et al.,*1983 proposed the use of the somatotype attitudinal distance(SAD) for between group comparison,which was followed after in this study.
Somatotype attitudinal distance (SAD) is defined as the three dimensional distance between any two somatopoints, calculated in somatotype component unit. This is the true distance between two somatopoints expressed as;

SAD = √ [(endomorphy$_A$ – endomorphy$_B$)^2 + (mesomorphy$_A$ – mesomorphy$_B$)^2 +(ectomorphy$_A$ – ectomorphy$_B$)^2] where A and B are either two individuals, two different times for one individual(in a longitudinal study) or two means.
When the SAD is equal to 0.5(i.e ½ unit), as the difference between means for pair-wise comparison, the estimate "size effect" is considered significant (Heath-Carter,1990).
SAM is calculated by dividing the sum of the SADs from their mean somatopoint by the number of subjects.

Quality Control

Several trainings were conducted for the research assistants used in collection of measurement data, to acquaint them with all protocols required for the anthropometric measurements to be made in accordance with the standardized procedures of the International Society of Advancement for Kinanthropometry (ISAK). The Average value for repeated measures for the variables were recorded to minimize the intra-observer error of measurement and each variable measurement was done by one observer. The intra-observer reliability coefficient (correlation) is reported in appendix I.

Limitation of the Study

This research work is limited in not taking into consideration children and adolescents who were although within the age range of the study but were not found attending primary and secondary schools within Port-Harcourt. The number of schools chosen was purposive, and may not reflect an adequate proportion of the total number of schools located within Port-Harcourt. Some schools initially considered for the research particularly private schools within the study area did not afford the researchers the opportunity to recruit their students into the study, as there were some administrative protocols which pose a delay in their giving permission for the work to be carried out. Also, some persons considered as relatively obese were not included when in the course of taking measurement, we encountered difficulty in grasping with the calliper, their skinfolds. This is a universal problem encountered with skinfold measurement even when using more precise skinfold callipers.

Statistical Analysis

The data obtained in our study was analysed by using SPSS(Statistical package for social Sciences, IBM® version 23, Armonk, New York) and XLSTAT version,2017, statistical software. Descriptive statistics for the Mean, Standard deviation (SD), minimum and maximum score was done for the somatotype variables, BMI and skinfold thicknesses. The SAD was used to estimate the "size effect" for difference between the means of the somatotype for age-wise comparison. SAD=0.5(i. e $_{1/2}$ unit) is considered statistically significant (Heath Carter, 1990) and the ANOVA followed by post-hoc (the Hochberg GT2) testing was used for age-wise comparison of basic anthropometric parameters(height and weight) treated with groups somatotype. The Independent t-test was used to assess sex differences in the measurable parameters.

RESULTS

Table 1: Descriptive statistics of basic anthropometric variables, somatotype components (means(x) and standard deviation, SD) and somatotype attitudinal mean (SAM) in respect to Age for the entire sample and Age-groups comparison.

Age (years)	&Number of subjects (N)	Height(m)	Weight(kg)	Endomorphy (x±SD)	Mesomorphy (x±SD)	Ectomorphy (x±SD)	SAM (x±SD)
7	42	1.24±0.09	23.64±4.46	1.4±0.42	3.7±0.75	3.5±1.22	1.28±0.74
8	40	1.29±0.08	26.75±6.39	1.6±0.63^{a}	3.9±1.13^{a}	3.1±1.42^{a}	1.62±0.99
9	42	1.35± 0.07	29.33±6.90	2.0±1.08^{a}	3.8±1.19^{a}	3.7±1.61^{a}	1.85±1.29
10	104	1.39±0.08*	32.61±7.29	2.0±1.08	4.0±1.26	3.5±1.37	1.76±1.24
11	135	1.44±0.07*	35.62±7.62*	2.0±1.03^{b}	3.7±1`.26^{b}	3.6±1.39^{b}	1.76±1.21
12	140	1.47±0.08*	39.39± 7.61*	2.2±0.97^{b}	4.0±1.18^{b}	3.3±1.21^{b}	1.66±1.02
13	112	1.52±0.08*	43.09±8.43*	2.3±1.05^{c}	3.9±1.50^{c}	3.4±1.41^{c}	1.96±1.21
14	122	1.55±0.11	49.25±11.94*	2.6±1.29^{c}	4.0±1.56^{c}	2.8±1.49^{c}	2.24±1.12
15	95	1.59±0.11	51.86±8.94	2.6±1.37^{d}	3.9±1.60^{d}	3.0±1.85^{d}	2.36±1.49
16	80	1.60±0.09	53.36±9.26	2.9±1.45^{d,e}	4.2±1.32^{d,e}	2.8±1.48^{d,e}	2.17±1.11
17	48	1.65±0.09	55.56±8.19	2.1±1.23^{e,f}	3.8±1.50^{e,f}	3.1±1.30^{e,f}	1.96±1.24
18	40	1.66±0.09	58.24±8.21	2.8±1.11^{f}	3.5±1.17^{f}	2.8±1.05^{f}	1.77±0.69

*Value is significant at $p< 0.05$. N= number of subjects per age group. SD= standard deviation, SAM= somatotype attitudinal mean .The superscripts; ^{a,b,c,d,e,f} are used to indicate the successive ages where the SAD≥ 0.5,to indicate significant difference in the somatotype in 3-dimensional representation, as seen in the somatochart(Carter *et al.*,1983).

Table 2: Distribution of somatotype category in respect to sex

Somatotype category	Female		Male	
	frequency	Percentage frequency	frequency	Percentage frequency
Balanced endomorph	1	0.2	-	-
Mesomorphic-endomorph	20	4.0	1	0.2
Mesomorph-endomorph	31	6.2	2	0.4
Endomorphic mesomorph	92*	18.4	43	8.6
Balanced mesomorph	49	9.8	48	9.6
Ectomorphic- mesomorph	50	10	132	26.4
Mesomorph-ectomorph	54	10.8	92	18.4
Mesomorphic- ectomorph	90	18.0	169*	33.8
Balanced ectomorph	65	13	6	1.2
Endomorphic- ectomorph	-	-	-	-
Endomorph-ectomorph	3	0.6	-	-
Ectomorphic- endomorph	1	0.2	-	-
Central	44	8.8	7	1.4
Total	500	100	500	100

*Indicates dominant somatotype category

Table 3: Descriptive statistics for demographic and somatotypes variables and independent t-tes in those variables within the total population

Parameters	Male(500) independent t-test			Female(500)			Total(1000)			
	Mean±S.D	min	Max	Mean±S.D	min	max	Mean±S.D	Min	max	t-value
Age (yrs)	12.4±2.76	7	18	12.8±2.76	7	18	12.6±2.76	7	18	2.27
Height (m)	1.48±0.16	1.1	1.9	1.50±0.12	1.2	1.8	1.49±0.14	1.1	1.9	3.03
Mass (kg)	40.8±13.50	15.5	98	43.3±11.83	20	82	42.04±12.74	15.5	98	4.42
BMI(kgm²)	18.26±3.52	9.2	33.6	18.85±3.24	12	31.4	18.56±3.39	9.2	33.6	4.98
Endomorphy	1.77±0.89	0.5	7.1	2.79±1.21	0.7	7.1	2.28±1.18	0.5	7.2	14.990
Mesomorphy	3.99±1.31	0.1	10.1	3.85±1.39	1.4	9.6	3.92±1.35	0.1	10.1	-1.631
Ectomorphy	3.35±1.51	0.1	13.3	3.12±1.39	0.1	6.7	3.23±1.46	0.1	13.3	-2.497

***Note:** S.D=Standard deviation, min=minimum, max=maximum, t= t-test statistics, P value=sigr =inference, S=significant, NS=not significant*

Table 4: Descriptive and Inferential statistics for skinfold thickness based on independent t-test

	Male [N=500]			Female [N=500]			Total [N=1000]		
Parameters	Mean±S.D	min	Max	Mean±S.D	min	max	Mean±S.D	Min	max
Triceps SF(mm)	6.19±3.08	2	28.5	9.62±4.49	3	30	7.90±4.21	2	30
Subscapular SF(mm)	5.86±2.69	2	27	8.47±3.78	3	25	7.17±3.53	2	27
Supraspinale SF(mm)	4.61±2.63	1.5	31	7.08±3.57	2	24	5.85±3.37	1.5	31
Calf SF(mm)	7.09±3.42	2	29.5	10.08±4.44	2	28.5	8.58±4.23	2	29.5
SUM of SF(mm)	12.05±5.56	5	55.5	18.09±7.94	6	53	15.07±7.49	5	55.5

***Note:** P-value, Probability value, Inf =Inference [S=significant], SF= skinfold thickness, significa t-value=t-test statistic*

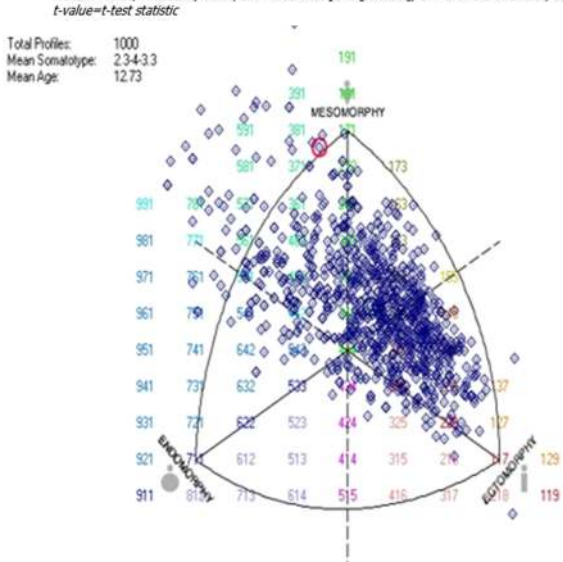

Figure 1: Somatotype distribution for the entire sample in the somatochart

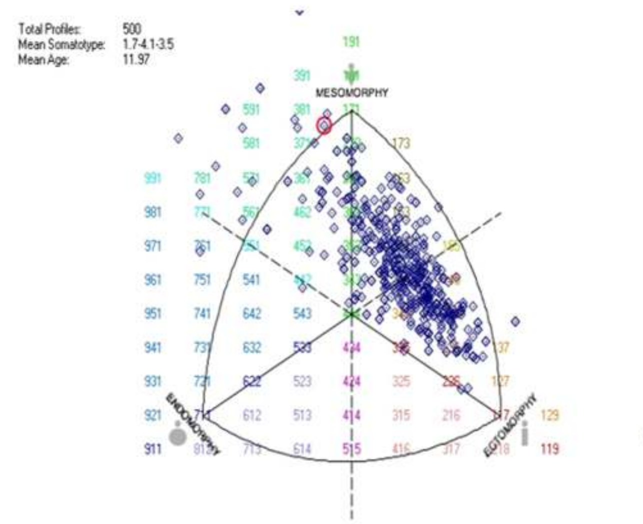

Figure 3: Distribution of the male somatotplots in the somatochart

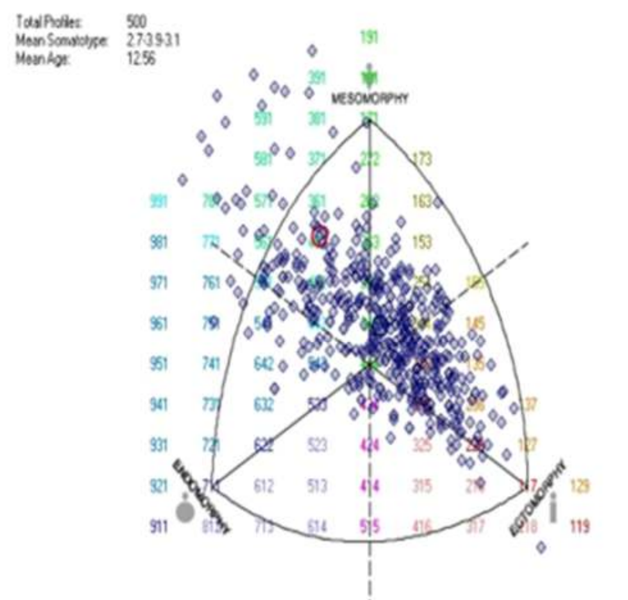

Figure 2: Distribution of the female somatotplots in the somatochart

DISCUSSION

There are few studies on somatotype distribution in children particularly in Nigeria and none to the best of the researcher's knowledge has been documented for children and adolescents in Port-Harcourt. It is noteworthy to recognise that studies on human physique has long intrigued researchers because of the association that was established between specific body types with certain disease conditions(Gertler and White,1954, Spain *et al.*,1963, Smith *et al.*,1979). Somatotype of healthy individuals have been associated with risk factors for disease (Valkov *et al.,* 1996) and earlier studies have shown that a particular somatotype (body type) may constitute a risk or predisposition to some disease (Sheldon, 1969; Bailey, 1985). Among adults, Individuals with a somatotype dorminant in mesomorphy and a pronounced endomorphy are likely to be hypertensive (Koleva *et al*., 2002). This observation was further confirmed by Yuan *et al.,* 2010, in their case-control study between hypertensive and healthy individuals.

In our study, we have investigated the gestalt somatotype of school-age children across the ages of 7 to 18 years within Port-Harcourt. The mean somatotype of the entire sample fell into the ectomorphic-mesomorph category (2.3-4-3.3). The mean somatotype observed in the male and female subgroups of the studied population when considered separately in the study fell into the ectomorphic-mesomorph and the balanced mesomorphy categories respectively. The somatotype of the entire sample shifts from mesomorph-ectomorph category (at 7years) through ectomorphic – mesomorph (at 8yrs, 12 and 13 yrs) to a balanced mesomorphy at 16 years and through ectomorphic-mesomorph(at 17 years) to a balanced mesomorphy category (at 18 years). This somatotype shift may suggest some slight changes in somatotype associated with or independent on growth. The difference in mean somatotype between successive ages were observed to be significant (where the calculated SAD between successive ages equals to 0.5 or above this value which include; between ages 8 and 9 years; 13 and 14 years; 16 and 17 years and 17 and 18 years) and it occurred when there was a shift from one somatotype category to another (ectomorphic-mesomorph at 8 years to mesomorph-ectomorph at 9 years).The change in somatotype does not always correspond with growth changes in body size(that is, changes in height and weight).For instance, the somatotype changed from 16 to 17 years with no significant change occurring in height and weight at this age interval. The ectomorphic- mesomorph physique in adult has been reported to have low prevalence of hypertension in adults (Valkov et al., 1996). The females in our study were more endomorphic than the males while the males were more ectomorphic. This conforms to the findings in other studies across different large scale surveys (Widiyani *et al*., 2011; Rahmawati, 2012; Subramanian *et al*., 2016; Kaur and Malik,2016).

There was significant difference only in endomorphy and ectomorphy components of the somatotype between sex in our study. This coincides with the study of Widiyani *et al*., 2011(similarly, Longkumer, 2016 and Subramanian *et al*., 2016), who also reported sex difference in these two somatotype components, in their work on children. Sex difference in somatotype has been attributed to a combined effect of genetics, age, maturation, physical activity, physical performance, nutition and environment (Strepnicka *et al*., 1976; Borms 1971;Slaughter and Lohman,1976; Eiben *et al*.,1986; Malik *et al*.,1986).

CONCLUSION

As far as it is known to the researcher, this study provides the first documented report on the somatotype distribution for children and adolescents in the south-south region of the country with particular reference to children and adolescents in Port-Harcourt. It will therefore add to the body of knowledge on research on somatotype studies among Nigerian populations.

COMPETING INTEREST: None exists.

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