PHOTOMORPHOMETRIC PINNA VARIATIONS IN YORUBA AND IGBO ETHNIC GROUPS IN NIGERIA.

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The work was carried out in collaboration between all authors. Author Ozioko Onyinye Mary designed the study, performed the statistical analysis, wrote the protocol and first draft of the manuscript and managed literature searches

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Abstract: The ear has been enlisted as a biometric identifiers that could be deployed to tackle security issues for national development, authentication, identification, storage and privacy of information. This study was aimed at photoanthropometrically determining auricular parameters, prevalence of pendulous earlobe, non pendulous earlobe, Darwin's tubercle, sexual dimorphism and bilateral asymmetry in pinna of Yorubas and Igbos. 400 subjects (10-30 years) comprising 200 Igbo and 200 Yorubas were selected using simple random sampling technique. Total Ear Length (TEL), Total Ear Width (TEW), Tragus-Anti Helix (TAH), Tragus-Anti Tragus (TAT) was measured, prevalent earlobe types was analyzed and sexual dimorphism of the measured parameters was investigated. The result indicates significant difference in the different morphometric parameters of ears in relation to sex ($P<0.05$), males were observed to have higher TEL, TEW, TAH ear parameters than females, ($P<0.05$) in the right and left ear of both tribes. Bilateral asymmetry was also observed in mean TAH values which was consistently higher on the right than the left ear side of males and females of both tribes. Tragus-Anti Tragus (TAT) was observed to have higher mean values in females than males in the right and left ears. Findings from this study show that ear parameters show sexual dimorphism, bilateral asymmetry and show significant correlation with anthropometric variables such as age, height and weight hence can be used as predictors to form regression formula for biometric identification, predictions to aid biological profiling, facial recognition from security cameras and planning of cosmetic surgery.

Key Words: Biometric identification, Igbos, Pinna Variations, Yorubas.

Introduction

The human ear is divided into external, middle and internal parts. The auricle/pinna is the visible first part of the ear that assists in directing the sound further into the ear. The human pinna is formed between the fourth and sixth weeks of gestation as the neural crest tissues of the first and second brachial arches interact with the underlying surface ectoderm of these arches.[1]

The human earlobe (*Lobulus auriculae*) is composed of tough areolar and adipose connective tissues, lacking the firmness and elasticity of the rest of the auricle. The ear lobe is deliberately an imperative feature of beauty in several other societies [2] and generally considered not to have any major biological function. Cruz and his research team identified two types of ear lobes namely; free type (pendulous) ear lobe and attached ear lobe (non-pendulous) [3]. Altman proposed that the pattern of free lobule is dominant while the attached lobule signifies the recessive trait.[4].

The outermost rim of the auricle is known as the Helix, it sometimes bears a tubercle known as Darwin's tubercle. The Antihelix is a curved prominence of cartilage parallel in front of the helix on the pinna.it has a raised, thick ridge which runs upwards parallel with the helix in the centre of the ear. It bends forward and divides into a slender protruding lower leg (crus inferior) and an upper wider leg (crus superior).Tragus is a prominence on the inner side of the external ear that lies in front of and partly closing the passage to the organs of hearing.

The ear has been enlisted as biometric identifiers that could be deployed to tackle security issues for national development, storage and privacy of information. Beyond authentication, biometrics have also been used to establish secure identities to fulfill Know Your Customer (KYC) requirements for opening bank accounts in Nigeria [5]. He also proffered that multimodal biometric should be used by all organisations in Nigeria to increase the reliability of the system and to provide an alternative to those people lacking some features like voice, fingers, eye, hand especially during voting, population census, etc. The Independent National Electoral Commission (INEC) should adopt face-print and finger-print or alternatively face-print with ear-print or palm-print or toe-print so that all eligible qualified citizen can be given the same chance to vote.

Nigeria is a federal republic country in West Africa, bordered in the west by Benin, in the east by Chad and Cameroon and in the north by Niger. It is a multinational state with over 500 ethnic groups of which Hausa, lgbo and Yoruba are the three main ethnic groups [6]. Hence this study aims to gather photo-anthropometric data of the pinna in the Igbo and Yoruba population, and to discuss its application to forensic science, individual identification and establish if any ethnic relationship exist between these tribes.

MATERIALS AND METHODS

A total of 200 Yoruba and 200 Igbo subjects were recruited for this study. Individuals whose normal ear morphology were altered by congenital anomalies, trauma, accidents or surgery were excluded from this study. Age of subjects ranged from 10-30 years because ear develops rapidly early childhood maturing at 6 years in females and 7 years in males [7]. The subjects were selected using stratified random sampling technique. None of the subjects had previous plastic surgery or trauma on the face. The Ethical approval was obtained from the Ethical Review Committee for Human Experimentation**,** College of Medicine Enugu State University of Science and Technology, Enugu Nigeria.

PROTOCOL OF PROCEDURE

Consent was taken from each participant after explaining the purpose of study in accordance with World Medical Association Declaration of Helinski Ethical Principles for Medical Research Involving Human Subjects (2008) [8].

i Pre-Image Acquisition:

Before photography was taken, Subjects were numbered using self-adhesive stickers of known length (45 x 13mm) at the sides of the face. Subjects' age, height, weight, sex and state of origin were recorded along with their identification numbers.

Female subjects were asked to clip back hair using hair clips to prevent it from obscuring the photograph of the ear. The tripod was adjusted so that it was equal with the height of the ear of the subject to ensure the ear was visible within the shots.

ii Image Acquisition:

- Images were acquired using Nikon D9O digital single lens reflex camera (manufactured by Nikon Corporation Tokyo, Japan) in the same lightening conditions with no illumination changes. Camera settings of 12.3 mega pixel, 600Dpi resolution, fixed local length 90 to150mm, high quality macro lens (which assures maximum depth of field) high aperture setting (f>16) and short exposure time(>125 milli sec) were also kept constant.
- Each subject was asked to relax with both hands hanging beside the trunk (See fig.1).
- Subjects positioned on a line marked 100cm from the camera [9] [10] [11].

- Camera was moved to either side in order to have photo taken parallel to the subject to reduce possibility of Image perspective distortion due to poor positioning.

Fig 1:Image acquisition

iii Image Processing

- When photos had been taken they were downloaded into Adobe illustrator version 17.(Adobe systems USA)
- All photos were cropped and sharpened if necessary for a clear picture. They were converted to gray scale (color removed) and contrast increased for the best possible definition. It was necessary for all photographs to be on the same scale for accuracy in measurement.
- Photographs with incorrect lightening or with unnoticed hairs concealing actual auricle dimensions were discarded.
- Image editing software (Image J 1.48 software j (v.j.48 ava 1.6.0 2064 bits written by Wayne Rasband, National institute of mental health, Bethsda, Mary land, USA) process image option was used to

A: Process the images-Sharpen images (optimize brightness), enhance contrast, and size to produce a clear image, subtract background and image calculation

B: Furthermore, this program has an analyze option dimension tool used to set scale and create a vertical dimension line that measures vertical distance between any 2 landmarks using y axis.

Thus ear dimension could be easily and accurately calculated while comparing landmarks

iv. Ear measurements Taken

Auricular landmarks were tagged on photograph of the subjects' ear and then measurement**s[12][13]** were taken and results were given to 2 decimal places.

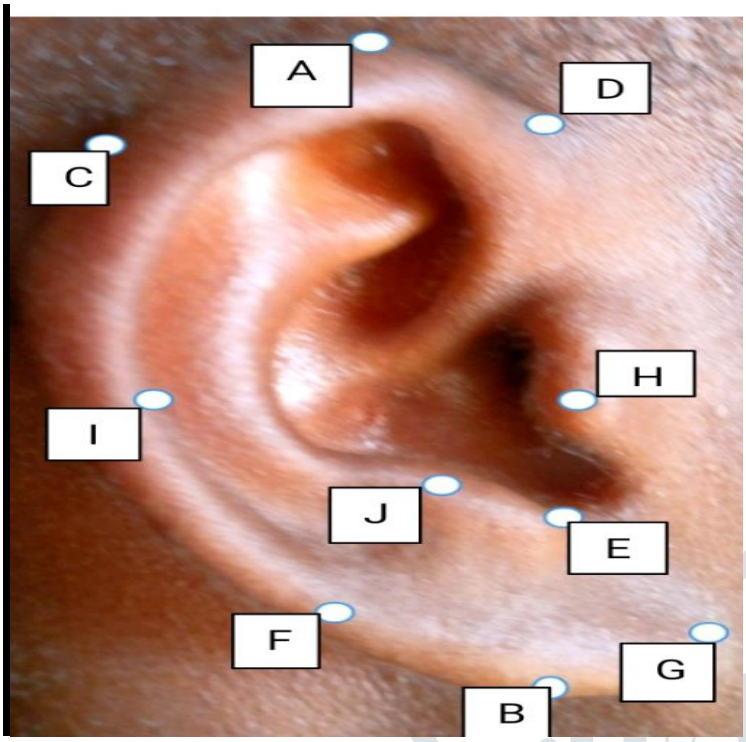

Figure 2: Ear land marks

The ear landmarks used in this study are; AG = Total Ear length, CD = Total Ear width, HI= Tragus –antihelix, HJ= Tragus- antitragus.

TOTAL EAR LENGHT:

Measurement of the distance between the most superior point of the ear or pinna and the most inferior point of the earlobe (Fig. 2).

TOTAL EAR WIDTH: Measurement of the distance between the most anterior point and the most posterior point of the pinna (Fig. 2).

TRAGUS – ANTI HELIX: This was measured as the distance between the prominent part of the Tragus and the most definitive part of the antihelix (Fig. 2).

TRAGUS ANTI TRAGUS: This was measured as the distance between the prominent part of the Tragus and the most definitive part of the antitragus (Fig 2).

HEIGHT (stature): Each subject was made to stand erect and height was measured using a stadiometer.

WEIGHT: Weight of each subject was checked using weighing scale. The subjects removed excess materials like shoes, belt, and watch etc.

EAR INDEX: was calculated as $\frac{\text{Ear width}}{\text{Ear length}} \times 100$[14]

LOBULAR INDEX: was calculated as $\frac{\text{Lobule width}}{\text{Lobule length}} \times 100$

Age of participants was obtained from self-reported date of birth [15]

STATISTICAL ANALYSIS

Images was analyzed using pro image J analyzer and the data obtained was presented in tables and subjected to statistical analysis by using t- test (independent and sample t-test) for the comparison of measurements taken from right and left ears between both sexes, Pearson correlation was used to establish the relationship between known anthropometric variables (Age, Height and Weight) and ear parameters measured with the aid of statistical package for social Sciences (SPSS) IBM version 20. $P< 0.05$ was considered statistically significant and the Mean and standard deviation was calculated for all the parameters.

RESULTS

TABLE 1: DESCRIPTIVE STATISTICS OF PARAMETERS MEASURED AND RELATIONSHIP TO AGE AND SEX OF IGBO SUBJECTS

Parameters	Age	Female Mean ± SD	Male Mean ± SD	P-value
Right TEL	10-12	5.55±0.31	6.17±0.23	0.01
	13-15	5.49±0.26	6.19±0.15	0.01
	16-18	5.64±0.37	6.18±0.19	0.01
	19-21	5.53±0.29	6.29±0.30	0.01
	22-24	5.67±0.21	6.26±0.33	0.28
	25-30	5.60±0.34	6.30±0.29	0.01
	Total	5.65±0.33	6.27±0.25	0.05
Right TEW	10-12	2.77±0.30	3.19±0.24	0.01
	13-15	2.64±0.30	3.18±0.28	0.01
	16-18	2.71±0.21	3.25±0.24	0.01
	19-21	2.66±0.30	3.34±0.26	0.01
	22-24	2.70±0.27	3.35±0.24	0.01
	25-30	2.56±0.38	3.31±0.23	0.01
	Total	2.67±0.29	3.81±0.25	0.01
Right Tragus-Anti helix	10-12	2.53±0.31	2.79±0.23	0.01
	13-15	2.51±0.31	2.79±0.21	0.01
	16-18	2.49±0.23	2.81±0.33	0.04
	19-21	2.54±0.33	2.72±0.30	0.07
	22-24	2.55±0.36	2.75±0.22	0.19
	25-30	2.55±0.25	2.72±0.29	0.08
	Total	2.53±0.30	2.76±0.26	0.07
Right Tragus – Anti tragus	10-12	0.47±0.29	0.24±0.21	0.01
	13-15	0.49±0.27	0.28±0.18	0.02
	16-18	0.43±0.26	0.33±0.25	0.41
	19-21	0.48±0.22	0.35±0.27	0.14
	22-24	0.49±0.12	0.21±0.15	0.01
	25-30	0.51±0.39	0.45±0.36	0.65
	Total	0.48±0.26	0.31±0.24	0.21
Left TEL	10-12	5.63±0.32	6.19±0.22	0.01
	13-15	5.55±0.28	6.20±0.15	0.01
	16-18	5.66±0.38	6.22±0.25	0.01
	19-21	5.67±0.32	6.32±0.28	0.01
	22-24	5.68±0.38	6.28±0.33	0.27
	25-30	5.71±0.32	6.33±0.28	0.01
	Total	5.58±0.30	6.23±0.25	0.05
Left TEW	10-12	2.76±0.30	3.16±0.23	0.01
	13-15	2.64±0.30	3.17±0.28	0.01
	16-18	2.70±0.21	3.23±0.27	0.01
	19-21	2.61±0.31	3.28±0.26	0.01
	22-24	2.70±0.27	3.32±0.23	0.01
	25-30	2.52±0.39	3.29±0.24	0.01
	Total	2.66±0.30	3.27±0.25	0.01
Left Tragus-Anti helix	10-12	2.52±0.33	2.71±0.31	0.02
	13-15	2.54±0.31	2.77±0.22	0.03

	16-18	2.45±0.24	2.69±0.43	0.19
	19-21	2.53±0.34	2.67±0.33	0.20
	22-24	2.54±0.37	2.67±0.33	0.50
	25-30	2.55±0.25	2.69±0.32	0.17
	Total	2.52±0.30	2.71±0.32	0.19
Left Tragus – Anti tragus	10-12	0.47±0.29	0.27±0.22	0.01
	13-15	0.48±0.26	0.30±0.18	0.04
	16-18	0.40±0.26	0.37±0.28	0.76
	19-21	0.46±0.22	0.39±0.29	0.43
	22-24	0.48±0.21	0.28±0.20	0.06
	25-30	0.50±0.39	0.38±0.39	0.39
	Total	0.47±0.29	0.32±0.26	0.28

* P<0.05 (Significant)

Data was analyzed using the t- test for independent samples between sexes on both sides (Table 1). It was observed that there is significant difference in the different auricular morphometric parameters of Igbos in relation to sex (P<0.05), except in Tragus – anti tragus values (P>0.05). Males were also observed to have a longer TEL, TEW, TLH, Tragus-Anti helix parameters. Females were also observed to have a longer Tragus – anti tragus than males at both sides of the ear. (P level).

TABLE 2: DESCRIPTIVE STATISTICS OF PARAMETERS MEASURED AND RELATIONSHIP TO AGE AND SEX OF YORUBA SUBJECTS

Parameters	**Age**	**Female**	**Male**	**P-value**
Right TEL	10-12	5.85±0.25	6.40±0.32	0.01
	13-15	5.95±0.25	6.41±0.24	0.01
	16-18	6.04±0.19	6.44±0.14	0.01
	19-21	5.81±0.29	6.48±0.27	0.01
	22-24	5.94±0.22	6.39±0.35	0.01
	25-30	5.89±0.32	6.57±0.31	0.01
	Total	5.91±0.28	6.45±0.30	0.01
Right TEW	10-12	2.83±0.32	3.40±0.24	0.01
	13-15	2.74±0.34	3.35±0.25	0.01
	16-18	2.91±0.11	3.41±0.10	0.01
	19-21	2.65±0.38	3.46±0.20	0.01
	22-24	2.89±0.24	3.50±0.11	0.01
	25-30	2.80±0.37	3.35±0.25	0.01
	Total	2.80±0.31	3.42±0.27	0.01
Right Tragus-Anti helix	10-12	2.45±0.23	2.73±0.30	0.01
	13-15	2.54±0.23	2.79±0.21	0.01
	16-18	2.41±0.18	2.76±0.21	0.01
	19-21	2.54±0.30	2.81±0.29	0.02
	22-24	2.45±0.23	2.74±0.18	0.01
	25-30	2.58±0.34	2.77±0.25	0.03
	Total	2.50±0.30	2.77±0.20	0.01
Right Tragus – Anti tragus	10-12	0.52±0.29	0.31±0.27	0.01
	13-15	0.53±0.28	0.28±0.31	0.03
	16-18	0.44±0.26	0.43±0.31	0.96
	19-21	0.55±0.30	0.30±0.25	0.02
	22-24	0.40±0.23	0.18±0.10	0.01
	25-30	0.46±0.31	0.19±0.12	0.01
	Total	0.48±0.30	0.28±0.27	0.17
Left TEL	10-12	5.70±0.32	6.13±0.21	0.01

	13-15	5.84±0.30	6.27±0.21	0.01
	16-18	5.86±0.30	6.39±0.14	0.01
	19-21	5.78±0.27	6.36±0.22	0.01
	22-24	5.75±0.29	6.34±0.32	0.01
	25-30	5.80±0.25	6.45±0.33	0.01
	Total	5.79±0.31	6.32±0.24	0.01
Left TEW	10-12	2.79±0.31	3.32±0.23	0.01
	13-15	2.69±0.32	3.29±0.25	0.01
	16-18	2.83±0.23	3.20±0.49	0.07
	19-21	2.71±0.30	3.37±0.25	0.01
	22-24	2.80±0.28	3.41±0.23	0.01
	25-30	2.58±0.35	3.31±0.21	0.01
	Total	2.73±0.26	3.32±0.30	0.01
Left Tragus-Anti helix	10-12	2.43±0.22	2.69±0.32	0.01
	13-15	2.50±0.24	2.75±0.24	0.01
	16-18	2.40±0.20	2.75±0.24	0.01
	19-21	2.49±0.29	2.79±0.29	0.01
	22-24	2.45±0.24	2.72±0.18	0.01
	25-30	2.57±0.36	2.76±0.24	0.04
	Total	2.47±0.30	2.74±0.31	0.01
Left Tragus – Anti tragus	10-12	0.53±0.29	0.31±0.27	0.01
	13-15	0.54±0.29	0.27±0.24	0.02
	16-18	0.49±0.28	0.40±0.35	0.59
	19-21	0.54±0.30	0.31±0.27	0.04
	22-24	0.43±0.26	0.18±0.10	0.01
	25-30	0.49±0.33	0.27±0.24	0.01
	Total	0.50±0.26	0.29±0.18	0.11

* P<0.05 (Significant)

Data was analyzed using the t- test for independent samples between sexes on both sides (Table 2). It was observed that there is significant difference in the different morphometric parameters of ears in relation to sex (P<0.05), except in Tragus-anti tragus (P>0.05). Females were also observed to have a longer Tragus – anti tragus values than males at both sides of the ear. (P level). Males were also observed to have a longer TEL, TEW, TAH parameters.

TABLE 3: DESCRIPTIVE STATISTICS OF PARAMETERS MEASURED ACROSS COHORT AND RELATIONSHIP TO SEX

Ear parameters	**Igbo**			**Yorubas**		
	Male	**female**	**p-value**	**Male**	**Female**	**p-value**
Right TEL	6.27±0.25	5.65±0.33	0.05	6.45±0.30	5.91±0.28	0.01
Right TEW	3.81±0.25	2.67±0.38	0.00	3.43±0.27	2.80±0.31	0.01
Right tragus –anti helix	2.76±0.26	2.53±0.30	0.07	2.77±0.20	2.50±0.30	0.01
Right Tragus –anti tragus	0.31±0.24	0.48±0.26	0.21	0.28±0.27	0.48±0.30	0.17
Left TEL	6.23±0.25	5.58±0.30	0.05	6.32±0.24	5.79±0.31	0.01
Left TEW	3.27±0.25	2.66±0.30	0.00	3.22±0.30	2.73±0.26	0.01
Left tragus – anti helix	2.17±0.32	2.52±0.30	0.19	2.74±0.31	2.47±0.30	0.01
Left Tragus –anti tragus	0.32±0.26	0.47±0.29	0.28	0.29±0.18	0.50±0.26	0.11

P-value = 0.05

Table 3 shows that Total ear length mean values of Yoruba males and females was significantly greater than Igbos at both ear sides. Total ear width mean values of Yoruba females was significantly greater than Igbos at both ear sides. Total ear width mean values of Igbo males was significantly greater than Yoruba at both ear sides. Tragus –anti tragus mean values of Igbo males was significantly greater than Yoruba at both ear sides. Tragus –anti helix of Igbo females was significantly greater than Yoruba at both ear sides. Tragus –anti helix mean values of Yoruba males was significantly greater than Igbos at both ear sides

TABLE 4: DIFFERENT ANTHROPOMETRIC PARAMETERS IN RELATION TO BILATERAL ASYMMETRY IN IGBOS AND YORUBAS

Igbos					Yorubas				
Parameter	**Side**	**Female**	**Male**	**P-value**	**Parameter**	**Side**	**Female**	**Male**	**P-value**
TEL	Left ear	5.58±0.30	6.23±0.25	0.005	**TEL**	Left ear	5.79±0.31	6.32±0.24	0.01
	Right ear	5.65±0.33	6.27±0.25	0.005		Right ear	5.91±0.28	6.45±0.30	0.01
TEW	Left ear	2.66±0.30	3.27±0.25	0.00	**TEW**	Left ear	2.73±0.26	3.32±0.30	0.01
	Right ear	2.67±0.38	3.81±0.25	0.00		Right ear	2.80±0.31	3.42±0.27	0.01
Tragus – anti Helix	Left ear	2.52±0.30	2.17±0.32	0.19	**Tragus – anti Helix**	Left ear	2.47±0.30	2.74±0.31	0.01
	Right ear	2.53±0.30	2.76±0.26	0.07		Right ear	2.50±0.30	2.77±0.20	0.01
Tragus-Anti tragus	Left ear	0.47±0.29	0.32±0.26	0.28	**Tragus-Anti tragus**	Left ear	0.50±0.26	0.29±0.18	0.11
	Right ear	0.48±0.26	0.31±0.24	0.21		Right ear	0.48±0.30	0.28±0.27	0.17

* P<0.05 (Significant)

The comparison of different anthropometric parameters in relation to ear side using paired sample t-test(Table 5) showed that the right parameters are significantly (P<0.05) higher in both gender and tribes than the left except in Tragus-anti tragus. This implies that the right ear is longer and wider than the left side.

CORRELATION ANALYSIS

Table 5. Correlation between anthropometric variables (weight, height and age) parameters of the ear of Yorubas and Igbos

Yorubas				Igbos			
Correlation	Age	Weight	Height	Correlation	Age	Weight	Height
Right ear	-0.011	0.070	-0.144*	Right ear	0.302**	0.247**	-0.001
Left ear	-0.080	0.127	0.062	Left ear	0.347**	0.254**	0.165*

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

From the table above, there was a negative weak significant correlation between height and right auricular parameters of Yoruba people. There was a significant positive weak correlation between weight, age of Igbos and auricular parameters measured. There was also a significant negative weak correlation between height of Igbos and auricular parameters.

TABLE 6

ETHNIC GROUP	DARWINS TUBERCLE		EAR LOBE ATTACHMENT	
	PRESENT	ABSENT	PENDULOUS	NON-PENDULOUS
YORUBA	13%	87%	70%	30%
IGBO	10%	90%	27%	73%

From the table above Darwin's tubercle was less prevalent in both tribes. Yoruba subjects had more pendulous ear lobe type. Igbo subjects had more of attached /non-pendulous ear lobe.

DISCUSSION

The typical appearance of the auricle is due to the arrangement of the curves of helix and antihelix, different ways of attachment of lobes and the presence or absence of Darwin tubercle which gives uniqueness to the ear [16]

The result of this study (Table 1 and 2) indicates that in both Tribes there was significant difference in the different morphometric parameters of ears in relation to sex ($P<0.05$), except in Tragus-Anti Tragus ($P>0.05$). Males were also observed to have a longer TEL, TEW, TAH parameters. This findings concur with the report of [17][13][9][18][19], Females however was observed to have a longer Tragus – anti tragus values than males at both sides of the ear. (P level). This marked sexual dimorphism in auricular parameters reported in our cohort could be attributed to auricular expansion which occurs earlier in males compared to females and continues till maturity[20][15].

The anatomical appearance of the auricle varies from individual to individual and between ethnic groups and race, its morphology is highly complex hence plastic surgeons require detailed information about normal pinna dimensions, the pinna's bilateral position on the face and general conformation[21]. Table 3 shows that Total ear length mean values of Yoruba males and females was significantly greater than Igbos at both ear sides. Total ear width mean values of Yoruba females was significantly greater than Igbos at both ear sides. Total ear width mean values of Igbo males was significantly greater than Yoruba at both ear sides. Tragus –anti tragus mean values of Igbo males was significantly greater than Yoruba at both ear sides. Tragus –anti helix of Igbo females was significantly greater than Yoruba at both ear sides. Tragus –anti helix mean values of Yoruba males was significantly greater than Igbos at both ear sides

The relationship between the left and right ears is important for determining the levels of genetic and environmental control of ear structure development [22] although in development, cells of both ear share the same genes, studies have shown that left and right ears of an individual may differ in size and structure as a result of environmental factors [20][23]. The comparison of different anthropometric parameters in relation to ear side using paired sample t-test(Table 5) showed that the right parameters are significantly ($P<0.05$) higher in both gender and tribes than the left except in Tragus-anti tragus. This implies that the right ear is longer and wider than the left side. This is in agreement with the studies of [15][24][9][25].

Ear lobe attachment variations have been linked with single nucleotide polymorphisms in two regions in chromosome 2 (2q 12.3 and 2q 31.1) [26. It is conceivable that genetic variation in ethnic groups could explain the differences in prevalence of earlobe attachments. Earlobe attachment type is known to affect the rate of lobular ptosis with age. The free earlobe type has a higher rate of sagging with age compared to the attached type [27][28]. The presence of Darwin's tubercle shows variable percentages in the Igbo and Yoruba ethnic populations of Nigeria. The present study found 13% and 10% frequency of presence of Darwin's tubercle in the Yoruba and Igbo subject respectively of our cohort. Pendulous earlobe was found to have much common occurrence the Yorubas as compared to the Igbo subjects of our cohort. Therefore, it is possible that the large proportion of pendulous earlobe among yorubas contributed to their longer Ear Length .this concurs with the studies of [26].

It is therefore conceivable that populations with larger frequency of free type may have higher incidence of **lobular ptosis** with age compared to those with attached ear lobes. In conclusion, ethnic differences are present in auricular anthropometric parameters, earlobe attachment type and prevalence of Darwin's tubercle. These features ought to be considered in aesthetic reconstruction of ear during earlobe rejuvenation and correction of projected ears. Further studies should be carried out using more ethnic populations for wider anthropometric coverage in Nigeria and Africa.

CONFLICT OF INTERESTS

None

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