ANTHROPOMETRIC STUDY OF THE AURICULAR DIMENSIONS IN ADOLESCENTS AMONG THE SOUTH-SOUTH NIGERIANS

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ABSTRACT

This study was aimed at documenting the auricular dimensions of Nigerians in the South- South and to find out if it will exhibit sexual dimorphism. 500 subjects were randomly selected, (250 males and 250 females) .Vanier callipers was used to carry out the measurement which are :Auricular length(AL), Auricular width (LW),Lobular length(LL),Lobular width (LW), Attachment length(ATTL). The data obtained was analyzed using independent sample t-test. The mean results obtained were as follows: males: AL(R-5.5724 ± 0.021, L-5.5572 ± 0.022)cm AW(R-2.9804 ± 0.022,L-2.9706 ± 0.023)cm, LL(R-1.4496 ± 0.014, L-1.4248 ± 0.014)cm, LW(R-1.7640 ± 0.027, L-1.7928 ± 0.027)cm, ATTL(R-4.5496 ± 0.022, L-4.5608 ± 0.025)cm, and females: AL(R-5.5836 ± 0.023, L-5.5720 ± 0.025)cm, AW(R-2.8412 ± 0.023,L-2.8526 ± 0.026)cm, LL(R-1.5116 ± 0.014, L-1.4820 ± 0.013)cm, LW(R-1.7820 ± 0.021, L-1.7576 ± 0.022)cm, ATTL(R-4.5828 ± 0.024, L-4.5976 ± 0.026)cm. The difference in the auricular length (AL), lobular width (LW), and attachment length (ATTL) of males and females showed no statistical significant difference (P>0.05). But the difference in the auricular width of males and females was statistically significant (P<0.05), with males showing greater auricular width on both sides when compared with females suggesting sexual dimorphism. The lobular length showed sexual dimorphism on both sides with females having greater values than males, this difference was statistically significant (p<0.05). However there was no statistical difference between the right and left auricular dimensions in males (P>0.05). There was also no statistical difference between the right and left auricular dimensions in females (P>0.05). This study presents metric data of

auricular dimensions for normal adolescents in south-south Nigerians. In comparison with other ethnic groups south-south Nigerians males seem to have the smallest lobular lengths, although their respective widths, auricular length and width, attachment length are comparable with those of others.

Keywords: Anthropometry, auricular dimensions, and south-south Nigerians

INTRODUCTION

The Auricle (***pinna***), is a modified cone-shaped structure that forms the visible part of the external ear (Chaurasia, 2007; Shier et al., 2000, and Moore et al., 2006). It develops from parts of the first and second brachial arches(Singh et al., 2005), and composed of irregularly shaped plate elastic cartilage covered by tightly adherent skin on all sides and a minor amount of adipose tissue along its posteromedial border and inside its lobule (Barbara et al.,2003).

Its general shape, size, and specific contours are usually distinctive in each person, with familial similarities (Guyton et al., 2006, and Sembulingam et al., 2006).Auricular abnormalities can serve as a pointer to the presence of birth defects in newborns(Singh et al., 2005)

ABNORMALIES OF THE AURICLE

1. Anotia- absent of the auricle
2. Cleft lobule – oculo-auricular syndrome (A mutation in the NKX5-3 Human homeobox gene(Daniel et al., 2008)
3. Failure of neural crest cell to ascend and mandibular development(it will fail to ascend)
4. Prominent ear(bat ear or wingnut ear)
5. Cryptotia(hidden ear)
6. Microtia- **(autosomal-recessive)** - A mutation in HOXA2.-poor dev of the ear(Fatemeh et al., 2008)
7. Macrotia-big ear or hypertrophy

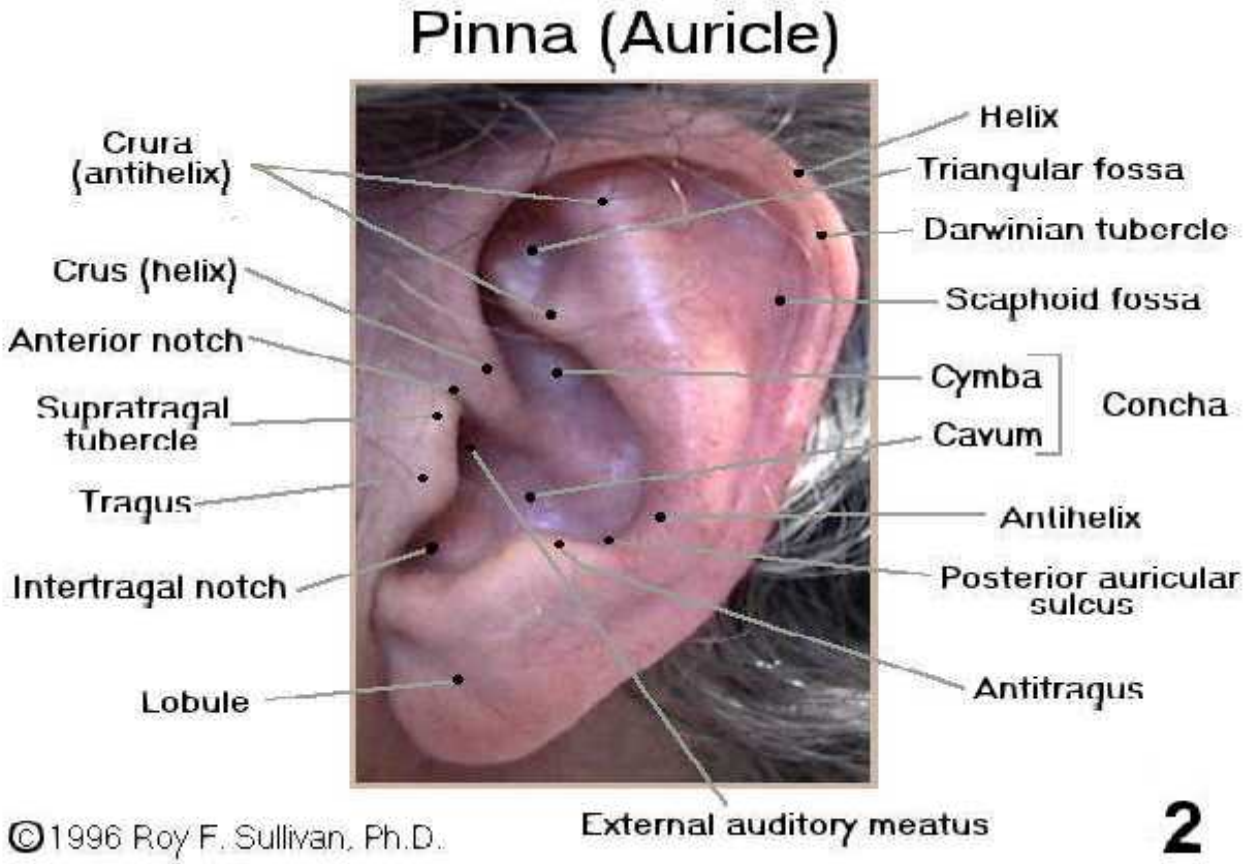


DIAGRAM ADOPTED FROM http://www.rcsullivan.com/www/pinnarfs.jpg

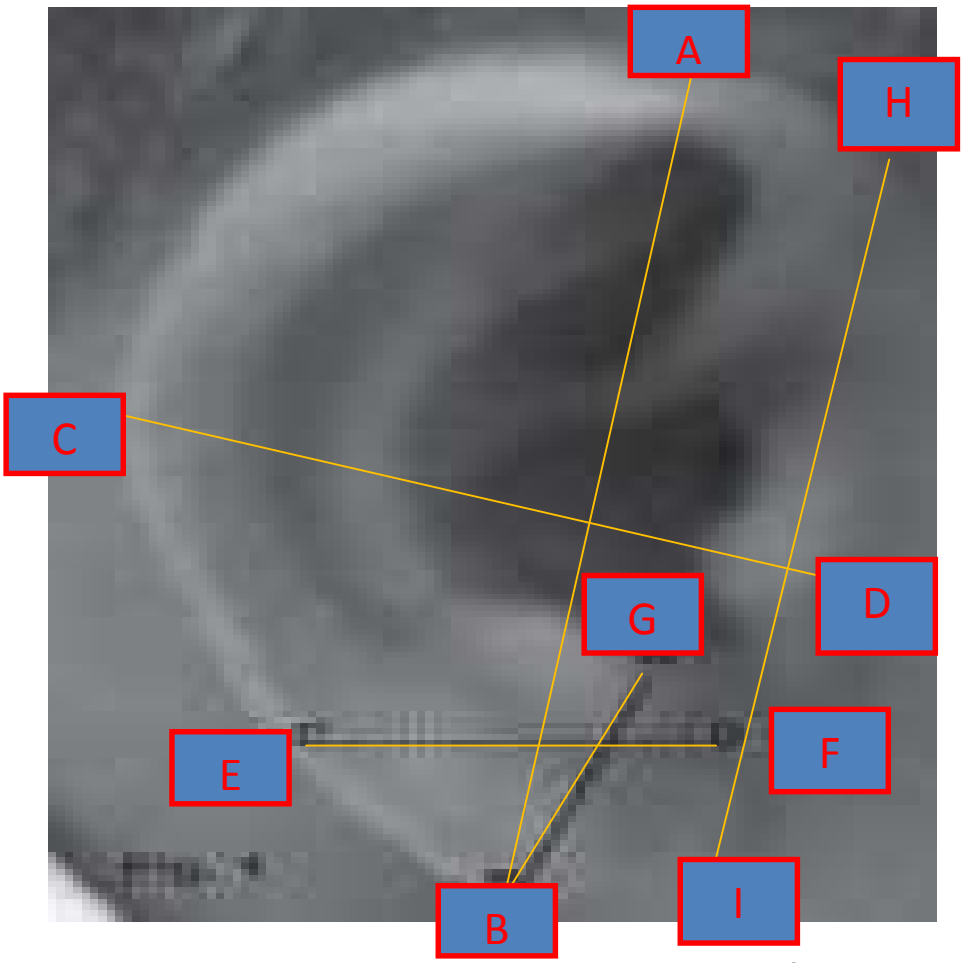
The auricle of Negro neonates compared to Caucasian are shorter (Ejiwunmi et al. 1984). Lettieri et al. (1993) reported that aneuploid foetuses could be identified sonographically considering the fetal ear length. Mckinney et al (1993) reported no correlation between lobular length and aging. Microtia patients have smaller auricular dimension when compared to normal individuals (Matsuka et al 1994). The existence of abnormality of the external ear as an early diagnostic feature for existence of an abnormality of the urinary tract, due to concomitant development of pinna and urinary tract during embryogenesis(Perrin et al. 1999). Coward et al, (2000) reported difference between the left and right auricle but in a small magnitude. The auricular size increased significantly with age in both sexes. The structural changes of the auricular cartilage associated with morphological age changes of elastic fibers may be one of the causes of expansion of the auricle after reaching adulthood (Ifo etal, 2001and Purkait etal, 2006). The auricle is a defining feature of the face and its subtle structures convey signs of age and gender (Brucker et al, 2003). Kalciogle et.al (2003) reported no statistical difference between auricular lengths of male and female infants, ear growth pattern and maturation size is early in girls compared

to that of boys during development.There are significant inter-racial differences in the ear width, ear length and ear position among the Caucasians and Jordanian term babies (fok etal, 2004). In comparison with other ethnic groups, Indian males seem to have the smallest auricle and lobular length (Purkait etal, 2006). The expansion of the external ear during adult life, evaluate the extent to which anatomical features appearing in ear prints my vary with time, the imprint of the lobe would be less stable with time (Meijerman et.al 2007).Auricular morphometry is related to body height and age (Hilko Wearda, 2007), gives information on age, sex, and developmental stage of life (Sharma et'al., 2008); decides facial characteristics, sexual dimorphism (Kang et.al, 2008).There is a relationship between auricular dimensions and children with cleft lip/ palate and down syndrome(Sforza et al 2005, Nathan et al 2008). Ekanem et al (2010) reported sexual dimorphism in the auricular length, lobular length (males been greater) and lobular width (females been greater), and increase in lobular length along with decrease in lobular width with age.

These changes in the auricclar dimensions underscore the need to document these values for the south-south adolescent Nigerians.

MATERIALS AND METHODS

Five hundred subjects (250 females and 250 males) adolescents all of South-South, Nigeria origin. Random selection was done from the six (6) states in the south-south. Adolescents between the ages of 13 to 18 were used for the study. Those with ear defects were excluded from the study (exclusion criteria). Vernier callipers (Tresna, Japan) measuring to 0.01cm was used in taking the ear measurements (Ifo etal, 2001). In all the subjects both auricles were assessed. Measurements were recorded manually into a notebook**.** Parameters were measured adopting the method of Kalcioglu et.al 2006.



a) Auricular length (labelled A-B): measures from the tip of the superaurale (helix)-A- to the subaurale (the base of the lobule)- B.
b) Auricular width (labelled C-D): measures from the auricular tubercle (of Darwin) of the helix (C) to the tragus (D).
c) The lobular length (labelled G-B): measures from the antitragus (G) to the base of the lobule(B)
d) the lobule width measures horizontally from one side to the lobule to the other E-F
e) Attachment length (H-I): measures from the point the auricle attaches to the head cranially(H) to the point the auricle attaches to the head caudally(I) in a vertical position

RESULTS

The result s of the Auricular Dimension among the south-south Nigeria are represented in the table below.

Table 1: Shows the Auricular length, Auricular width, Lobular length, Lobular width, and Attachment length of males and females. Mean ±SD

PARAMETER	MALES(CM)		FEMALES(CM)		LEVEL OF SIGNIFICANCE
	LEFT	RIGHT	LEFT	RIGHT	
AURICULAR LENGTH	5.5572±.022	5.5724±.021	5.5720±.025	5.5836±.023	Not significant (p>0.05). female
AURICULAR WIDTH	2.9706±.023	2.9804±.022	2.8526±.026	2.8412±.023	Significant (p< 0.05). male
LOBULAR LENGTH	1.4248±.014	1.4496±.014	1.4820±.013	1.5116±.014	Significant (p< 0.05). female
LOBULAR WIDTH	1.7928±.027	1.7640±.027	1.7576±.022	1.7820±.021	Not significant (p>0.05). male
ATTACHMENT LENGTH	4.5608±.025	4.5496±.022	4.5976±.026	4.5828±.024	Not significant (p>0.05). male

Table 2: Shows the correlation between the left and right auricle in males.

PARAMETERS	AL(L):AL(R)	AW(L): AW(R)	LL(L):LL(R)	LW(L):LW(R)	ATTL(L):ATTL(R)
PEARSON'S CORRELATION	0.865	0.599	0.717	0.733	0.793
CRITICAL VALUE	0.128	0.128	0.128	0.128	0.128

Table 3: Shows the correlation between the left and right auricle in females

PARAMETERS	AL(L):AL(R)	AW(L): AW(R)	LL(L):LL(R)	LW(L):LW(R)	ATTL(L):ATTL(R)
PEARSON'S CORRELATION	0.910	0.616	0.633	0.766	0.796
CRITICAL VALUE	0.128	0.128	0.128	0.128	0.128

OBSERVATION

It was observed that auricular dimensions in males between the right and left showed no significant differences ($p>0.05$), but showed a strong positive significant correlation between them at 0.01 level.

There was no statistical significant difference ($p>0.05$) between the right and left dimensions in females, however the right showed greater values in AL, LL, LW. The AW and ATTL were greater on the left. There was a strong positive significant correlation coefficient at 0.01 levels.

No statistical significant differences ($p>0.05$) in auricular length (females mean values been greater), attachment length and lobular Width (males was greater) was observed.

Mean values of auricular width differs significantly with males being greater ($p<0.05$) suggesting sexual dimorphism.

The lobular length between males and females was found to be statistically significant ($p<0.05$) with female being greater suggesting sexual dimorphism.

DISCUSSION

Sexual dimorphism in auricular width and lobular length, similar to the observation of (Fok, 2003; Purkait et al., 2007, and Ekanem et al., 2010), this may be attributed to aging process (Ito et al., 2001 and Brucker et al., 2003), continuous growth in length (Purkait et al., 2007) gender and age (Sharma et al., 2008), this contradicts Kang (2008).

There was no sexual dimorphism observed in the auricular length, lobular width, attachment length, similar to the observation of (Kalcioglu et al., 2006 and Purkait et al., 2007), this may be due to the fact that there is uniform growth from childhood to adolescent, this Contradicts the observation of previous studies(Fok et al., 2003; Kang, 2008 and Ekanem et al., 2010).

The auricular dimensions are influenced by height (Hilko W, 2007), sex and race (Kang, 2008), age (Sharma et al., 2008).

****This information could be useful in forensic medicine, investigation and criminology, otomorphology for identification of age dependent changes in lobules of the human ear and its influence on individual identification through photographs, surgical treatment of congenital deformities and reconstruction, classifying race of a person and identification of dead persons. Comparative

studies have shown that; Negro neonates have shorter auricle when compared to Caucasians (Ejiwunmi et al., 1984)

In a study on Caucasian, African, Asian and Indian subjects the average length of lobule was found to be 1.9 cm range (1.3-2.5 cm) (McKinney et al., 1993). Chinese babies have shorter auricular length than Caucasians and Jordanians(Fok, 2003);

Indian males have smallest auricular length and lobular length but the width are comparable with those of others (Purkait, 2007); Northwest Indian males have lesser lobular dimension than the Caucasian and Japanese in growing age groups males (Sharma, 2008);

In our study the value for males in the South-South Nigeria is less. Probably the reason for this difference is, our study is dealing with the adolescent age groups and race.

CONCLUSION

From our study the males in the South-South Nigeria seem to have the smallest lobular dimension compared to documented studies on the Indians, Caucasians, Japanese, Asians, Jordanians and Chinese. The parameters used in the present study gives information on sex of a person and play a valuable role in forensic investigation, criminology and anthropology for identification.

It is however recommended that further studies be done on the other geo-political zones in Nigeria

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