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Study of the Nasal Indices and Bialar Angle of the Ibo and Yoruba Ethnic groups of Nigeria

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Abstract
This study was designed to determined and compare the nasal indices and bialar angles of the Ibo and Yoruba ethnic groups in order to classify their nose types and to analyze the presence or absence of sexual dimorphism, also to provide base line data for anthropologists, aesthetic and reconstruction surgeons. The current study sample consists of 384 subjects, 228 Ibo subjects and 156 Yoruba subjects were measured for nasal length and nasal breath thereafter nasal indices were calculated from the measurements while bialar angle was measured in 220 Ibo subjects and 143 Yoruba subjects. Results obtained showed that Ibo males and females had a mean nasal index of 10762± 1-09 and 98-89±1.30, bialar angle of 107.12± 1.08 and 100.57± 1.35 respectively while Yoruba males and females has a mean nasal index of 110.30± 1.92 and 97.07± 2.11, bialar angle of 99.29± 1.12 and 95.48± 1.05 respectively. Sexual dimorphism was observed with significantly higher values of all parameters measured in males compared to females of both ethnic groups. The data of this study have shown that both ethnic groups have platyrrhine nose type (Broad nose) and an obtuse bialar angle with Ibos having broader nose than the Yorubas.
Keywords: Bialar angle, nasal index, sexual dimorphism, platyrrhine, Ibo, Yoruba, ethnic groups.

1.Introduction

Nasal anthropometry is the study concerned with the measurements of the proportion, size and shape of the human nose. Dimensions obtained have a great potential to guide clinical decision, public health policy, relevant in aesthetic and reconstructive surgery, forensic investigation as well as studying variation in humans. The nose is part of the respiratory tract superior to the hard palate which contains the peripheral organ of smell (Sinnatamby, 2001). It can be divided into two parts, external and internal parts (Hochman *et al*., 2002). The external nose is the part that protrudes forward from the face (Sinnatamby, 2006). The shape of the nose is determined by certain variables which are race, tribes and environmental climatic conditions (Last, 1981). Narrower noses are said to be favored in cold and dry climates while broader nose in warmer and moister ones (Hall and Hall, 1995).

Furthermore, the three major categories of nose on the basis of nasal index are leptorrhine (Long and narrow nose) with a nasal index of 69.90 or less, mesorrhine (medium) with a nasal index between 70 and 84.90 and platyrrhine (broad nose) with a nasal index of 85 and above (Williams *et al*., 1995; Porter and Olson, 2003).

Within and outside Nigeria, several studies have been carried out and documented on nasal indices (Risley, 1915; Akpa *et al*., 2003; Oladipo *et al*., 2009; Oladipo *et al*., 2010; Eboh, 2011; Eboh and John, 2011) but little or nothing has been documented on bialar angle. The aim of this work is to bridge this gap in nasal anthropometry by documenting the nasal indices and bialar angles of the Ibo and Yoruba ethnic groups which could be of importance to anthropologists, aesthetic/reconstruction surgeons and medical practitioners.

2.Subjects and Methods

Three hundred and eighty four healthy subjects from Ibo and Yoruba ethnic groups (Ibo subjects 228, 139 males and 89 females; Yoruba subjects 156, 88 males and 68 females) participated in this research –prior to this study, consent was obtained from each subject and the purpose of the study conveyed to them. Criteria for this study include: subjects parents and grand parents should be Ibo by tribe and Yoruba by tribe for Ibo and Yoruba subjects respectively, the subjects must have lived there for at least the first fifteen years of their lives, no surgery or trauma of the face or nose, no history of craniofacial deformities and no respiratory diseases.

Subjects were told to sit in a chair in a relaxed condition and not to change facial expression while taking photographs in order to get accurate results. Thereafter, surface landmarks were noted on the face before frontal and basal views were photographed using a digital camera and photographs were developed to a life- size scale for measurement of various nasal dimensions. With the aid of ruler, Pencil, pair of divider, compasses and

protractor, the following nasal dimensions were measured: nasal height (NH), from nasion to subnasale; nasal breadth (NB), from right to left nasal alae and bialar angle (BAA), angle formed by both nasal alae in the basal image of the nose.

Nasal index was calculated as the ratio of nasal width to nasal height multiplied by 100. The data were subjected to statistical analysis and the means of the measurements were compared using student's t-test ($P<0.05$).

3.Results

Results are summarized in the tables below.

Table -1 clearly showed that the nasal indices of Ibo males and females found in this study was 107.62± 1.09 and 98.89± 1.30 respectively while that of Yoruba males and females was 110.30± 1.92 and 97.07 ± 2.11respectively. The type of nose among the studied ethnic groups was platyrrhine.

The bialar angle of Ibo males and females was 107.12 ± 1.08 and 100.57± 1.35, respectively while that of Yoruba males and females was 99.29 ± 1.12 and 95.48 ± 1.05 respectively showing that the Ibos have a more obtuse bialar angle than the Yorubas, therefore the Ibos have a broader nose than the Yorubas.

It was also observed that all the valves obtained from the two parameters measured in this study were higher in males than females.

Table 2 compared the nasal parameters of the two sexes. The results got were all significant at $p=0.01$ except the gender difference in the bialar angle among the Yorubas which was significant at $p=0.05$.

Table 3 compared the nasal parameters of the two ethnic groups. There was no significant difference in the nasal indices but the Ibos had greater bialar angles which were significant at $p=0.01$.

4.Discussion

The nose is one of the aesthetic facial triad (Canut, 1996), and the values of nasal index and bialar angle of different ethnic groups is of great importance in nasal surgery, medical practice and forensic investigation. This study has shown that ethnic and sexual differences in nasal parameters (nasal index and bialar angle) exist among human population. The results obtained from this study showed that the Ibo and Yoruba ethnic groups have platyrrhine nose type. This is in conformity with the work of Risley (1915) who reported that the nasal index of Africans is basically platyrrhihe. Also Oladipo *et al*., (2007) reported platyrrhine nose type for Ibo, Yoruba and Ijaw ethnic groups. In 2009, Oladipo *et al.*, also documented a platyrrhine nose for Urhobo and Itsekiri ethnic groups of Nigeria. In both studies, sexual dimorphism was observed with males having significantly higher nasal index than females ($P<0.05$). Their results are in agreement with the results obtained in this study.

Bialar angle of both ethnic groups was an obtuse angle with Ibos having a significantly higher bialar angle than the Yorubas revealing that the Ibos have a broader nose than the Yorubas.

The results of this research will serve as a guide to aesthetic/reconstruction surgeons when improving the personality and beauty of a person and also in correcting nasal defects. It could also be useful during forensic investigations in differentiating the ethnic groups in this study.

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Table 1:Nasal Indices and Bialar angles of the different ethnic groups

Nasal parameter		**Ethnic group**			
		Ibo		**Yoruba**	
		Male	**Female**	**Male**	**Female**
Nasal indices	N	139	89	88	68
	X+ SEM	107.62 ±1.09	98.89 ±1.30	110.30 ±1.92	97.07 ±2.11
Bialar angle	N	135	85	83	60
	X+ SEM (in degrees)	107.12 ±1.08	100.57 ±1.35	99.29 ±1.12	95.48 ±1.05

X: mean, SEM: Standard error of mean, N=number of subjects.

Table 2: Comparing the nasal indices and bialar angles of the sexes

Parameter	**Ethnic Group**	**Sex**	X ± SEM	SEM_D	**t-ratio**		
					Calculated	**Table**	
						P= 0.05	P= 0.01
Nasal Indices	**Ibo**	Male n=139	107.62 ±1.09	1.70	5.15	1.96*	2.58*
		Female n=89	98.89 ±1.30				
	Yoruba	Male n=88	110.30 ±1.92	2.85	4.64	1.96*	2.58*
		Female n=68	97.07 ±2.11				
Bialar Angles	**Ibo**	Male n=135	107.12 ±1.08	1.73	3.79	1.96*	2.58*
		Female n=85	100.57 ±1.35				
	Yoruba	Male n=83	99.29 ±1.12	1.54	2.48	1.96*	2.58
		Female n=60	95.48 ±1.05				

*Significant; n: Number of subjects

Table 3: Comparing the nasal indices and bialar angles of the ethnic groups

Parameter	**Sex**	**Ethnic Group**	X ± SEM	SEM_D	**t-ratio**		
					Calculated	**Table**	
						P= 0.05	P= 0.01
Nasal Indices	**Male**	**Ibo** n=139	107.62 ±1.09	2.21	1.21	1.96	2.58
		Yoruba n=88	110.30 ±1.92				
	Female	**Ibo** n=89	98.89 ±1.30	2.48	0.73	1.96	2.58
		Yoruba n=68	97.07 ±2.11				
Bialar Angles	**Male**	**Ibo** n=135	107.12 ±1.08	1.56	5.03	1.96*	2.58*
		Yoruba n=83	99.29 ±1.12				
	Female	**Ibo** n=85	100.57 ±1.35	1.71	2.98	1.96*	2.58*
		Yoruba n=60	95.48 ±1.05				

*Significant; n: Number of subjects