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Cephalofacial Indices of the Ibo and Yoruba Ethnic groups in Southern Nigeria

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Abstract
Cephalofacial analysis is an important parameter useful anthropologically to ascertain racial, ethnical and sexual differences. This work aimed at determining cephalic and facial indices and the anatomical types of head and face found among the Ibo and Yoruba tribes. Study was cited in two geographical locations in southern Nigeria depending on the ethnic group. Five hundred human subjects were randomly selected, comprising 300 and 200 subjects of the Ibo and Yoruba ethnic groups respectively with age range of 18-35 years.
Results obtained showed that Ibo males and females had mean cephalic indices of 81.79±0.43 and 81.68±0.52 respectively and facial (prosopic) indices of 75.49±0.50 and 73.76±0.54 respectively while the Yoruba males and females had mean cephalic indices of 80.40±0.49 and 78.47±0.66 respectively and facial indices of 77.60 ± 2.82 and 73.72±1.05 respectively. Based on the Cephalic Index, the dominant head form found among the Ibo ethnic group was brachycephaly while the Yoruba ethnic group had a head form ranging from brachycephaly to mesocephaly. Facial indices showed dominant hypereuriprosopic face type for the two ethnic groups. The cephalic index only showed sexual dimorphism in the Yoruba ethnic group but the facial index showed significant gender difference in the two ethnic groups studied.Data got from this research could be useful in forensic medicine and reconstructive surgeries.
Keywords: Cephalic index, facial index, sexual dimorphism.

1.Introduction

The measurement of Cephalofacial dimensions is an important aspect in physical anthropology. This is because data got could serve as a useful tool in ascertaining the anatomical head and face forms of individuals. International standard human head shape can be dolichocephalic, brachycephalic, mesocephalic or hyper-brachycephalic and human face shapes can be hyper-euriprosopic, euriprosopic, mesoprosopic, leptoprosopic or hyperleptoprosopic, see Tables 1 and 2, (William *et al.*, 1995, Panero, 1979). Human body dimensions are affected by ecological, biological, geographical, racial, gender, age and nutritional factors (Golalipour *et al.*, 2003, Rajlakshni *et al.*, 2001, Radovic *et al.*,2000, Tuli *et al.*, 1995,Okupe *et al.*, 1984). Based on these factors, age, sex and ethnic groups in certain geographical zones are given due consideration in anthropometric studies,(William *et al.*, 1995, Golalipour, 2006, Del sol, 2005).
The cephalic and facial indices of three ethnic groups in Gombe State, Nigeria have been reported,(Maina *et al.*, 2012) Findings revealed that all males and females of the three ethnic groups share close similarities in head types and some variations in face types.
Mean cephalic and facial (prosopic) indices of 71.90%, 73.92% respectively in males and 99.39%, 97.54% respectively in female of North-eastern Nigeria have also been reported,(Raji *et al.*, 2010). There was no significant difference between the dominant and rare head types in both genders.
Mean cephalic indices of 78.4% and 81.90% and prosopic indices of 83.22% and 84.86% in Sistani and Baluchi subjects respectively have been reported,(Zabra *et al.*, 2006). Results obtained showed there was significant difference between the two groups ($P<0.0001$). Safikhani *et al.*, (2005) researched on the anatomical type of head and face in children under 6 years in Ahwaz, the results indicated that brachycephalic (38%) was the most common anatomical type of head, and euryprosopic (38.6%) and hyperlepto-prosopic type (4.5%) for the face type.
This present study will provide a baseline date with Cephalofacial database of the Ibo and Yoruba ethnic groups.

2.Materials and Methods

A total of 500 university students without history of Cephalofacial surgery or trauma and obstructive hair style were selected from University of Technology, Owerri (Ibo subjects) and University of Ibadan (Yoruba subjects), all in Southern Nigeria, with age ranging from 18-35 years. The sample comprised of 170 males and 130 females from the Ibo ethnic group and 100 each of male and female from the Yoruba ethnic group.
Before commencement of the experiment, consent was obtained from the subjects and approval from ethical committee of the university authority was obtained.

Subjects were made to sit in a relaxed condition on a chair, head in anatomical position and the following dimensions of head and face (length and width) were measured using a spreading caliper:
Cephalic Length: Distance from Glabella to inion
Cephalic Width: Distance between parietal eminences
Face length: Distance from nasion to menton
Face width: Distance between Zygomatic arches.
Thereafter, Cephalic and facial (prosopic) indices were calculated using the formula below,(Hrdlika, 1952).

$$\text{Cephalic Index (CI)} = \frac{\text{Head width}}{\text{Head Length}} \times 100$$

$$\text{Prosopic index (PI)} = \frac{\text{Facial length}}{\text{Facial width}} \times 100$$

The data was subjected to statistical analysis using student's t-test. Afterwards, head and face types were classified,(William *et al.,* 1995, Panero, 1979).

3.Results

Results are as presented on the tables below.
From table 3, Cephalic indices in Ibo males and females is 81.74±0.43 and 81.68±0.52 respectively while that of Yoruba males and females is 80.40±0.49 and 78.47±0.66 respectively. Cephalic indices of both ethnic groups were compared, Ibo subjects had a higher Cephalic index than Yoruba subjects. This difference was statistically significant at $P<0.05$. Comparison of the Cephalic index showed sexually dimorphism among the Yoruba ethnic group at $P<0.05$ but no statistical difference exist among the Ibo ethnic group. The mean Cephalic index placed Yoruba males, Ibo males and females in brachycephalic group and Yoruba females in mesocephalic group.
From table 4, the mean prosopic indices in Ibo males and females are 75.49±0.50 and 73.76±0.54 respectively while that of Yoruba males and females are 77.60±2.82 and 73.72±1.05 respectively. Inter-ethnic analysis revealed a higher prosopic index in Yoruba males than in Ibo males. There is no statistical significant difference between the prosopic indices of the female population in both ethnic groups ($P<0.05$). Sexual dimorphism exist between the males and females of both ethnic groups. This difference was statistically significant at $P<0.05$.
From table 5, the mean prosopic indices placed the genders of both ethnic groups in hypereuriprosopic face group (very broad face).
Table 6 showed that the Cephalic and prosopic indices of the male subjects are higher than those of the female subjects in both ethnic groups.

4.Discussion

In this work, head forms were classified based on International standard of classification,(William *et al.,* 1995, Panero, 1979), it was observed that those with Cephalic index < 70 and > 89.90 was not accommodated in the classification.
This present study shows that hypereuryprosopic is the dominant type of face in both ethnic groups. This is not similar to a study conducted in Maiduguri – North Eastern Nigeria, where hypereuryprosopic was the rarest face type in both male and female population,(Raji *et al.,* 2010).
It has been recorded in this work that the dominant head type found among Yoruba males, Ibo males and females is brachycephalic while Yoruba females in mesocephalic. These head forms is also seen in the temperate zones where the head forms have been reported to be more round (mesocephalic or brachycephalic), (Bharati *et al.,* 2001).
Eroje *et al.* (2010), reported Cephalic indices for Obia male and female as 73.68 and 72.24 respectively. Oladipo *et al.* (2009) determined the Cephalic index for Ogu males and females as 74.83 and 74.8, Ikwerre males and females as 74.9 and 74.6 respectively, Efik male and females as 73.16 and 73.80, Ibibio male and female as 73.48 and 73.80 respectively. The head forms in these studies are docicephalic which is different from this present study.
The ethnic groups in their studies are also found in Southern Nigeria. This is a clear indication that ethnicity is a major determining factor in determining head dimensions,(Golalipour and Haidari, 2005, Bayat and Ghanbari, 2010).
Umar *et al.* (2011), recorded a mean Cephalic index of 79.52 for the Yorubas, which placed both male and female in mesocephalic group. This present study revealed that Yoruba males are predominantly brachycephalic while the females are mesocephalic. Based on this observation, sex should be given due consideration in reporting results in anthropometric studies,(William *et al.,* 1995, Golalipour, 2006, Del sol, 2005).

This research would be of great value to medical and forensic experts.

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Table 1: Classification of head types,(Williams *et al.*, 1995).

Head shape	Cephalic index (CI)	Range
Dolicocephalic (Long head)	>70	70-74.9
Mesocephalic (Moderate head)	>75	75-79.9
Brachycephalic (short head)	> 80	80-84.9
Hyperbrachycephalic (very short head)	> 85	85-89.9

Table 2: Classification of face types,(Williams *et al.*, 1995, Panero, 1979).

Face shape	Prosopic index (PI)	Range
Hypereuriprosopic (very short head)	< 79.9	
Euriprosopic (Broad face)	>80	80-84.9
Mesoprosopic (Round face)	≤ 85	85-89.9
Leptoprosopic (Long face)	>90	90-94.9
Hyperleptoprosopic (very long face)	> 95	

Table 3: Mean Cephalic indices of the two ethnic groups

Ethnic Group	Sex	Sample size (n)	Cephalic Index (Mean ±SEM)
Ibo	Male	170	81.74 ±0.43
	Female	130	81.68 ±0.52
Yoruba	Male	100	80.40 ±0.49
	Female	100	78.47 ±0.66

SEM:- Standard Error of Mean; n:- sample size

Table 4: Distribution of head shapes in Ibo and Yoruba ethnic groups.

Cephalic index / headtype	Ethnic group							
	Ibo				Yoruba			
	No. of male	%	No. of female	%	No. of Male	%	No. of Female	%
<70	5	2.94	3	2.31	0	0	4	4
Dolichocephalic 70-.9	7	4.12	4	3.10	13	13	11	11
Mesocephalic 75-79.9	47	27.6	38	29.23	33	33	35	35

Brachycephalic 80-84.9	76	44.7	58	44.62	41	41	30	30
Hyper brachycephalic 85-89.9	28	16.4	22	16.92	10	10	14	14
> 89.90	7	4.12	5	3.83	3	3	6	6

Table 5: Mean prosopic indices of Ibo and Yoruba ethnic groups

Ethnic group	Sex	Sample size (n)	Prosopic index (Mean ± SEM)
Ibo	Male	170	75.49 ±0.50
	Female	130	73.76 ±0.54
Yoruba	Male	100	77.60 ±2.82
	Female	100	73.72 ±1.05

Table 6: Distribution of face shapes in Ibo and Yoruba ethnic groups.

Prosopic index Range/face type	Ethnic group							
	Ibo				Yoruba			
	No. of male	%	No. of female	%	No. of Male	%	No. of Female	%
Hypereuryprosopic <79.9	136	80	106	81.54	66	66	79	79
Euryprosopic 80-84.0	26	15.3	21	16.15	24	24	16	16
Mesoprosopic 85-89.9	7	4.12	3	2.31	6	6	3	3
Leptoprosopic 90-94.9	0	0	0	0	3	3	2	2
Hyperleptoprosopic >95	1	0.59	0	0	1	1	0	0