

Study of the cranial (cephalic) and facial (prosopic) indexes of Ukwuani indigenes in Nigeria

ABSTRACT

Background: It is noted that the head and face shapes of humans from different ethnic groups vary markedly. The cause of these variations has been attributed to several environmental factors. Measurements of these indexes become a necessity to prove that individuals from a particular ethnic group have similar head and face forms. **Aim:** The present study was aimed at measuring the cephalic and prosopic indexes of Ukwuani indigenes of Delta State. **Materials and Method:** A total of 315 subjects (165 males and 150 females) were selected by simple random sampling and were measured for their cranial and facial lengths and breadth and the respective indexes were calculated. **Results:** Males had a mean prosopic index of 99.15 whereas females had a marginally lower mean prosopic index of 94.54, both belonged to the hyperleptoprosopic facial group and observed differences between both genders were statistically not significant ($P = 0.25$). The mean cranial index in males and females was 80.21 and 79.04, respectively, both belonged to the mesocephalic cranial group and observed differences between both genders were statistically significant ($P = 0.01$). **Conclusion:** There was no statistically significant gender difference with regards to prosopic index but with regards to cephalic index the observed gender difference was statistically significant.

Key words: Cephalic index, hyperleptoprosopic, mesocephalic, prosopic index

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INTRODUCTION

Measurements in anthropometry serve as viable means through which variations in human body dimensions can be effectively observed for studies. It is observed that morphological features of different races are not randomly distributed but appear in geographical clusters.^[1] These variations are caused by various environmental, ecological, biological, racial and nutritional factors.^[2] The start of physical anthropometry can most probably be attributed to the increased interest in racial classification which entails measurement of the human body dimensions.^[3,4] Cephalometry is a branch of anthropometry that is largely confined to human head measurements.^[3] It is made up of two indexes which are the cephalic (cranial) and the prosopic (facial) indexes. These indexes are important parameters, useful in anthropological studies for ascertaining variations.^[2]

Cephalometry is a useful tool in individual identification and it is also useful to cosmetic surgeons during the process of facial reconstructive surgery.^[2] It also helps by giving a baseline data which can be taken into consideration when designing facial equipment such as goggles and masks.^[5]

Although studies of this type have been carried out in neighbouring ethnic groups,^[6,7] no such study, to the best of our knowledge has been carried out on the Ukwuani ethnic group in Delta State, Nigeria.

The major aim of this research was therefore to study the head and face forms of the Ukwuani indigenes of Delta State and create a baseline data which would be useful in future researches.

Access this article online

Quick Response Code:



Website:

www.bioanthrojournal.org

DOI:

10.4103/2315-7992.204686

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How to cite this article: Ojieh U, Enaohwo M, Ebeye A. Study of the cranial (cephalic) and facial (prosopic) indexes of Ukwuani indigenes in Nigeria. *Ann Bioanthropol* 2016;4:71-4.

MATERIALS AND METHODS

The Ukwuani and Aboh ethnic groups make the Ndokwa of today and together they inhabit the area of the Niger Delta approximately lying within longitude 6°6' and 6°41'.^[8]

Both groups inhabit Ukwuani, Ndokwa West and Ndokwa East Local Government Areas of Delta State in Nigeria, with the Ukwuani being the larger of both ethnic groups and inhabiting the first two local government areas, i.e. Ukwuani and Ndokwa West.^[9]

Although the Ukwuani people can be found in parts of both delta and rivers states of Nigeria, the Ukwuani in this contest are those solely of delta state origin.

In this study, 315 volunteered subjects (165 male and 150 female) who are indigenes of Ukwuani and Ndokwa West Local Government Areas of Delta State were selected randomly. They were confirmed to be from the Ukwuani ethnic group by both their parents and their grandparents. Their ages ranged from 18 to 30 years. Subjects with facial or cranial deformities and subjects with hairstyles who did not allow for effective measurement were excluded from the survey. Measurements were taken with the subjects sitting down in a relaxed mood and with his head in an anatomical position. Careful palpations were ensured before measurements were carried out. The following measurements were taken:

- Cranial length – Glabella to inion
- Cranial breadth – Distance between parietal eminences
- Facial length – Nasion to gnathion
- Facial breadth – Distance between zygomatic arches.

The cephalic and prosopic index were calculated based on the International Anatomical Descriptions.^[2] By this, the respective indexes were given by the following formulas:

$$\text{Cephalic index} = \frac{\text{Cranial breadth}}{\text{Cranial length}} \times 100$$

$$\text{Prosopic index} = \frac{\text{Facial length}}{\text{Facial breadth}} \times 100$$

The cephalic and prosopic indexes were grouped according to the anatomical basis of facial and cranial phenotyping [Tables 1 and 2].^[5]

Statistical analysis was carried out on the data using the IBM Corp, IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY:IBM Corp and included frequencies and percentages. *T*-test was used to test for any statistical differences.

RESULTS

Results showed the mean cephalic indexes for males and females to be 80.21 ± 5.77 and 79.04 ± 4.38 , respectively,

and the mean prosopic indexes to be 99.15 ± 6.11 and 94.54 ± 9.89 with males having larger values for both indexes. A statistically significant difference was observed between male and female cephalic indexes ($P = 0.01$), but this was not the case between the male and female prosopic indexes ($P = 0.25$), using a 95% confidence interval [Table 3].

Based on the cephalic phenotypes, results showed that the population was majorly mesocephalic with 44.2% and 44% of males and females having that head shape and the least occurring head shape being the hyperbrachicephalic head with 12.7% and 10% of males and females having that shape [Table 4].

Prosopic phenotypes showed a largely hyperleptoprosopic population with 75.2% and 43.3% of males and females having this face type and the rarest type being the hypereuryprosopic face type with 0% and 0.7% occurrence in males and females [Table 5].

DISCUSSION

Anthropometric studies on cephalic and prosopic indexes have shown that most Africans, Indians, Australians, North Americans, and Central Europeans have the dolicocephalic head form, whereas people from the Middle East have the mesocephalic head form.^[2,10,11]

Table 1: Cranial types based on cephalic index

Cephalic phenotype	Cephalic index
Dolichocephalic	$\leq 70-74.9$
Mesocephalic	75-79.9
Brachicephalic	80-84.9
Hyperbrachicephalic	$\geq 85-89.9$

Table 2: Facial types based on prosopic index

Facial phenotype	Prosopic index
Hypereuryprosopic	$\leq 75-79.9$
Euryprosopic	80-84.9
Mesoprosopic	85-89.9
Leptoprosopic	90-94.9
Hyperleptoprosopic	≥ 95

Table 3: Parameters measured and their values

Parameters measured	Males= 165	Females= 150
Cranial length	18.67 ± 0.82	18.09 ± 0.69
Cranial breadth	14.73 ± 0.66	14.22 ± 0.63
Facial length	12.32 ± 0.74	11.97 ± 0.65
Facial breadth	12.56 ± 0.73	12.59 ± 0.61
Cephalic index	80.21 ± 5.77	79.04 ± 4.38
Prosopic index	99.15 ± 6.11	94.54 ± 9.89

Results represented as mean $\pm$ standard deviation

Table 4: Distribution of head shapes among the study population

Phenotypes	Males	Females
Head shapes		
Brachicephalic	45 (27.3)	44 (29.3)
Dolichocephalic	26 (15.8)	25 (16.7)
Hyperbrachicephalic	21 (12.7)	15 (10.0)
Mesocephalic	73 (44.2)	66 (44.0)

Results represented as *n* (%)**Table 5: Distribution of head and face shapes among the study population**

Phenotypes	Males	Females
Face shapes		
Euryprosopic	2 (1.2)	8 (5.3)
Hypereuryprosopic	0 (0)	1 (0.7)
Hyperleptoprosopic	124 (75.2)	65 (43.3)
Leptoprosopic	28 (17.0)	47 (31.3)
Mesoprosopic	11 (6.7)	29 (19.3)

Results represented as *n* (%)

In the present study, the mean cephalic index for males and females was 80.21 ± 5.77 and 79.04 ± 4.38 , respectively. The results from our study differed from those of other studies among other ethnic groups. Indigenes of Maiduguri Northern Nigeria had an index of 71.90 and 73.92 for males and females, respectively,^[2] among the Ogbia tribe of Bayelsa State, it was 73.68 and 72.24,^[12] Urhobos had an index of 78.04, Edos 78.21 and Ibos were reported to have an index of 77.63.^[6] Indians had a mean cephalic index of 72.64 and 72.06 for males and females,^[13] in Northern Brazil, it was 80.93 and in Southern Brazil, the index was 79.68,^[14] Iranians had an index of 84.80,^[15] whereas South Africans were reported to have an index of 80.29.^[16]

The most common head shape observed in this study was the mesocephalic head shape. This result buttresses the thought that variation occurs with regards to cranial phenotypic distribution among various populations. Studies among the Ogbia tribe of Bayelsa showed the population to be majorly dolichocephalic,^[12] Indians were also reported to be mostly dolichocephalic^[13] while Brazilians, Iranians, and South Africans were brachicephalic.^[14-16]

Our results, however, agreed with the results of studies on the Urhobos, Edos, and Ijaws, all of which were mesocephalic.^[6]

With regards to facial indexes, the mean facial index of the male and females population was 99.15 ± 6.11 and 94.54 ± 9.89 , respectively. These values showed some degree of variations from values of indexes from other tribes. Studies among the Fars and Turkman in Iran showed their prosopic index to be 74.3 and 81.6, respectively,^[17] Bini

people of Nigeria had 86.93,^[18] Indian males and females had an index of 87.19 and 86.75, respectively, whereas Malaysian males and females had indexes of 85.72 and 87.91, respectively.^[19]

Our results, however, fell within the same range with results of indigenes of Maiduguri whose prosopic indexes were 99.59 and 97.54 for males and females, respectively.^[2]

The most common facial type among the Ukwuani indigenes in this present study was the hyperleptoprosopic type, and this also proved the theory of variations in facial phenotypic ratios among ethnic groups. Indians and Malaysians were shown to be mesoprosopic,^[19] whereas the Fars group in Iran were shown to be hypereuryprosopic.^[15]

This study has investigated the cephalic and prosopic indexes of the Ukwuanis in Delta State and has determined the most dominant cranial and facial forms among males and females within this ethnic group. The study has also shown that a statistically significant difference exists between the cephalic indexes of males and females, but none exists between their respective prosopic indexes.

Data gotten from this study can serve as a baseline for anthropologists, aid in local anthropometric evaluations, and serve as a baseline line with which comparisons can be made between the Ukwuani and other ethnic groups.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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