

## A Craniometric Study of Adult Humans Skulls from Southwestern Nigeria

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**Abstract:** The study aims at determining the cranial indices of some skulls recovered from cadavers sourced from Southwestern regions of Nigeria, mainly populated by Yoruba ethnic tribe. The cranial indices of 85 human skulls were determined by measuring the maximum cranial length (mcl) and maximum cranial breadth (mcb) using Goniometre fitted with sliding calliper. The cranial index was determined by finding the percentage of the ratio mcb to mcl x100. The skulls were deemed from adult individuals because of their complete teeth eruption and obliteration of sutures. Gross sexual dimorphic characteristics such as size and overall rugose expression of cranial features (pronounced mastoid process, strong brow ridge) were used to divide skulls into 56 males and 29 females. The mean cranial indices for male and female skulls examined were  $72.97 \pm 2.16$  and  $71.72 \pm 2.48$ , respectively, thus putting them in the dolichocranic population. There were no significant differences in the cranial indices of the male and female skulls ( $p > 0.05$ ). Thus cranial index is not sexually dimorphic in the studied skulls. The result of this study will be of forensic anthropologic importance to the populations from where the skulls were sourced.

**Key words:** Cranial indices, dolichocranic, origin, sexual dimorphism

### INTRODUCTION

Cephalometry is the scientific measurement of the dimensions of the head, usually through the use of standardized lateral skullradiographs or cephalograms (El-Feghi *et al.*, 2004). It has a special usefulness in forensic practice where cranial remains were compared with existing photographic and radiographic records in identification and in attempts at establishing reliable craniometric differentiation between the use of cephalic index to classify human remains has been known since antiquity. Variations in cephalic indices between and within populations have been attributed to a complex interaction between genetic and environmental factors (Kasai *et al.*, 1993). Internationally accepted techniques of craniometry/cephalometry have promoted a large number of comparable data for male and to a lesser extent, females (Berry and Berry, 1976).

Currently, the development of computed tomography and medical imaging techniques is widely accepted as a standard protocol for clinical diagnosis and surgical treatment planning. It enables 3D reconstruction and assesses craniofacial morphometric data both inner and outer anatomical landmark for the craniometric study (Cavalcanti *et al.*, 2004; Park *et al.*, 2006; Rooppakhun *et al.*, 2010).

The anthropometric study of cephalic indices conducted on Urhobo and Itsekiri ethnic groups of Nigeria showed mean cephalic indices of 82.16 and 86.80,

respectively (Oladipo and Paul, 2009), while a similar study conducted on Ijaws and Igbos, reported the mean cephalic indices of 80.98, 78.24, 79.04 and 76.83 for Ijaw males, Ijaw females, Igbo males and Igbo females, respectively (Oladipo and Olotu, 2006). Others include the work of Oladipo *et al.* (2009) among the Ogoni adult subjects and Odokuma *et al.* (2010) among the Urhobos, Ibos and Edos ethnic groups of Nigeria. The present study investigates a cranial index of dead remains recovered from Southwestern region of Nigeria and this will no doubt form a baseline data for subsequent studies especially as regards the populations from which the skulls were sourced.

### MATERIALS AND METHODS

In July and August, 2009 at the Department of Human Anatomy, University of Ibadan, Nigeria; ninety-six adult human skulls of unknown sex and age from collections in the Department of Anatomy, University of Ibadan, Ibadan, and environs in Nigeria were studied. The skulls were prosected specimens from dissected cadavers used for students' training over the minimum period of ten years. The cadavers were sourced from Lagos, Sagamu, Ijebu-ode, Ile-Ife, Ibadan and other cities within Southwest region of Nigeria. Only eight-five pieces were suitable for cranial index determinations.

With the aid of a Goniometer fitted with sliding calliper, the maximum cranial length (mcl) (the distance

from the glabella to the furthest point at the occiput) and also the maximum cranial breadth (mcb) (the greatest breadth measured at right angles to the saggital plane) were measured.

Maximum cranial length = Summit of glabella to furthest occipital point.

Maximum cranial breadth = greatest breadth, at right angles to saggital plane.

$\frac{\text{Maximum cranial breadth}}{\text{Maximum cranial length}} \times 100 = \text{Cranial Index}$

above index were determined on the basis of international anatomical descriptive (Williams *et al.*, 1995). Depending upon this index, the types of head and the types of head shapes were followed as (Williams *et al.*, 1995).

Cranial shape	Cranial Index (CI) range (%)
Dolichocranic	CI<74.9
Mesocranic	75<CI<79.9
Brachyranic	80<CI<84.9
Hyperbrachyranic	85<CI<89.9 and CI<89.9

Using gross sexual dimorphic characteristics such as size and overall rugose expression of cranial features (pronounced mastoid process, strong browridge); the skulls were divided into 56 males and 29 females, their cranial indices were calculated as stated above and compared.

## RESULTS AND DISCUSSION

Eighty-five out of the 96 skulls recovered were suitable for craniometric studies (Table 1). The minimum, maximum and mean values of cranial index were summarized in Table 2. The minimum and maximum cranial indices were 66.86 and 78.10, respectively, while the mean value and standard deviation (SD) of all the studied skulls was 72.54±2.33. The mean cranial indices for male and female skulls examined were 72.97±2.16 and 71.72±2.48, respectively (Table 3). There is no significant difference between the cranial indices of male and female skulls (p>0.05).

Of the methods of measuring skulls for the purpose of determining topographical relations, cranial indices, or the cephalic indices in case of measurements taken on the living human is the most important. The broader or rounder a head is, the higher is its cephalic index, and vice versa. The cranial index of the skulls in present study is 72.54, thereby representing skulls from dolichocephalic heads.

The cranial index in the present study showed that the skulls represent dolicocephalic heads which is at variance with mesocranic skull of the Hausas/Fulanis of Northern

Table 1: Proportion of skull suitable for analysis

	Cases					
	Included		Excluded		Total	
	No.	%	No.	%	No.	%
Cranial index	85	88.5	11	11.5	96	100.0
* Gender						

Table 2: The mean value for cranial index

	No.	Min.	Max.	Mean	SD
Cranial index	85	66.86	78.10	72.54	2.33
Valid N (listwise)	85				

Table 3: Determination of cranial index by gender

No.	Gender	Mean	SD
29	Female	71.72 <sup>a</sup>	2.48
56	Male	72.97 <sup>a</sup>	2.16
85	Total	72.54	2.33

<sup>a</sup>: Similar alphabets mean that there is no significant difference (p>0.05)

Nigeria and brachycephalic head shape of the Ogonis in Southern Nigeria reported by Adebisi (2003) and Oladipo *et al.* (2009) respectively. However, the result in this study agrees with the studies carried out on newborns in Maiduguri metropolis in Nigeria (Bharati *et al.*, 2001; Garba *et al.*, 2008). The insignificant differences observed in the cranial indices of the male and female skulls also agree with the report that sexual dimorphism is less marked in humans than in some other primates (Williams *et al.*, 1973). This has been attributed to the paedomorphic tendency of the human stock, not only females but also males being less divergent in adult development, from their own juvenile form, than in the case among other primates (Abbie, 1952).

Since the skulls used in this study are prospected from the cadavers sourced locally from Southwest region of Nigeria inhabited mainly by Yoruba ethnic group, this study is therefore an exercise in determining the cranial index of the Yoruba ethnic group. The study will therefore be of use in forensic, anthropological and clinical medicine.

## CONCLUSION

The conclusion can be drawn that the cranial index of Yoruba ethnic group in Southwestern Nigeria is dolichocranic with no statistical significant difference between male and female individuals.

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