

COMPARATIVE ASSESSMENT OF CEPHALIC INDEX AMONG BINI AND IGBO TRIBES IN BENIN CITY, NIGERIA

OmotosoDayo Rotimi ^{*1}, Baxter-Grillo Dorothea ², AdagboyinOsa ³, Bienonwu Emmanuel ⁴.

^{*1}Lecturer, Department of Anatomy, College of Health Sciences, Igbinedion University, Okada, Edo State, Nigeria.

²Professor, Department of Anatomy, College of Medicine, University of Benin, Benin City, Nigeria.

³Lecturer, Department of Anatomy, College of Health Sciences, Igbinedion University, Okada, Edo State, Nigeria.

⁴Lecturer, Department of Anatomy, College of Health Sciences, Igbinedion University, Okada, Edo State, Nigeria.

ABSTRACT

Background and Objective: In cephalometry, parameters like the head length, head width and cephalic index are very important in the description of human morphology, variation in different gender and races of human population and making comparison between healthy individuals and clinical patients. Furthermore, they can also be used to categorize human head morphology into different types and to make comparative study of different human populations. This comparative study was carried out to describe the cranial morphology among adolescent and young adult individuals of Bini and Igbo ethnic groups in Nigeria.

Methodology: This study involved 260 Bini and 245 Igbo subjects between ages 11 – 25 years. The head length of each subject was measured between the glabella and inion while the head breadth measured between the parietal prominences using spreading and sliding calipers. The cephalic index of each subject was calculated as the ratio of the head breadth to its length expressed as a percentage.

Results: The mean cephalic indices among the two tribes were higher in males than in females in all the age groups studied. With increasing age, the cephalic index value decreases among the Bini tribe but increases among the Igbo tribe. Based on the morphological classification of the cephalic index values, the brachycephalic head type was the most prevalent among both Bini (55.4%) and Igbo (66.9) tribes while the least common head type among the Bini and Igbo tribes were hyperbrachycephalic (8.1%) and dolicephalic (0.4%) respectively.

Conclusion: The cephalic index demonstrated inter-tribal variation, prominent intra-tribal sexual dimorphism and brachycephalization is the dominant trend in cranial morphology of both Bini and Igbo tribes in Nigeria.

KEYWORD: Cephalic Index, Bini Tribe, Igbo Tribe, Nigeria.

Address for Correspondence: OmotosoDayo Rotimi, Department of Anatomy, College of Health Sciences, Igbinedion University, Okada, Edo State, Nigeria. Phone: +2348034779886

E-Mail: dayohmts@gmail.com

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INTRODUCTION

Cephalometry is a branch of anthropometry in

which the dimensions of the head and face are measured. The head length, head width and

cephalic index are very important cephalometric parameters which can be used to describe variation in different gender and races of human population. They are also used to make comparative study of different generations of human population [1]. In addition, cephalometric parameters have been used in physical anthropometric studies to describe human morphology, to make comparison between healthy individuals and clinical patients as well as to make inference on some clinical conditions of patients. A study among Whites and African-Americans showed the relevance of the cephalic index in identification of humans with obstructive sleep apnea [2-4]. Cephalometric parameters are also useful in inter-racial and intra-racial classification and categorization of human physical morphology [5]. Furthermore, the cephalic index can also be used to categorize human head morphology into different types including brachycephalic (or broad), mesocephalic (or intermediate) and dolicephalic (or long) head types [6-8]. Other areas of applications of cephalometry include forensic medicine, plastic and reconstructive surgery, orthodontics, clinical diagnosis and treatment planning [9]. Cephalometric dimensions (cephalic index inclusive) like other anthropometric dimensions can be influenced by geographical location, age and gender [10,11]. The cephalic index can also be used to describe variation among Indian population in different geographical regions and variation in human population with increasing age [12,13]. This study was therefore carried out to comparatively assess the cephalic index among the Bini and Igbo tribes resident in Benin City, Edo State, Nigeria and to determine the morphological classification of the head types in the two ethnic groups under study.

MATERIALS AND METHODS

This comparative study was carried out among adolescents and young adults of Bini and Igbo tribes resident in Benin City, Edo State, Nigeria. This study involved randomly selected 505 subjects including 260 Bini subjects (130 males and 130 females) and 245 Igbo subjects (127 males and 118 females) between ages 11 – 25 years. The head length of each subject was measured between the glabella and inion while the head breadth measured between the

parietal prominences using spreading caliper. The cephalic index of each subject was calculated as the ratio of the head breadth to its length expressed as a percentage [9,14].

$$\text{Cephalic Index} = \frac{\text{Maximum Head Breadth}}{\text{Maximum Head Length}} \times 100$$

The data obtained was statistically analyzed using IBM-SPSS (version 20). Relevant statistical values were obtained using student T-test and analysis of variance (ANOVA). Individuals with craniofacial anomalies were excluded from this study.

RESULTS

The result showed that in all age groups of both tribes, the mean cephalic index is higher in males than in females. With increasing age, the mean cephalic index value reduces among the Bini tribe but increases among the Igbo tribe (Figures 1 and 2). The Bini males and females between 11 – 15 years have mean cephalic index values 82.35 ± 1.11 and 82.04 ± 1.12 while the values among the Igbo males and females were 82.06 ± 1.47 and 81.27 ± 1.46 respectively. In higher age groups, the Igbo males and females have higher cephalic index values than the Bini subjects (Figures 3 and 4). For instance, in age group 16 – 20 years, the mean cephalic index for Bini males and females were 81.35 ± 1.19 and 81.23 ± 1.31 while the values for Igbo males and females were 83.00 ± 1.39 and 82.41 ± 1.61 respectively. The mean cephalic index values for Bini males and females between 21 – 25 years were 79.74 ± 1.11 and 79.06 ± 0.96 while the values for Igbo males and females were 84.66 ± 1.03 and 83.47 ± 1.16 respectively. The brachycephalic head type was the most common head type among both the Bini (55.4%) and Igbo (66.9%) tribes. The least common head type among the Bini tribe was hyperbrachycephaly (8.1%) while dolicephalic head type was least common among the Igbo tribe (0.4%). There was no dolicephalic head type observed among the Bini tribe (Figures 6 and 7).

Table 1: Statistical values for the Cephalic Index of Bini and Igbo tribes aged between 11-15 years.

Variables	BINI tribe		IGBO tribe	
	Male	Female	Male	Female
Mean \pm S.E.M	82.35 \pm 1.11	82.04 \pm 1.12	82.06 \pm 1.47	81.27 \pm 1.46
S. D.	2.62	2.64	3.06	3

Table 2: Statistical values for the Cephalic Index of Bini and Igbo tribes aged between 16-20 years.

Variables	BINI tribe		IGBO tribe	
	Male	Female	Male	Female
Mean \pm S.E.M	81.35 \pm 1.19	81.23 \pm 1.31	83.00 \pm 1.39	82.41 \pm 1.61
S. D.	2.62	2.27	3.03	2.01

Table 3: Statistical values for the Cephalic Index of Bini and Igbo tribes aged between 21-25 years

Variables	BINI tribe		IGBO tribe	
	Male	Female	Male	Female
Mean \pm S.E.M	79.47 \pm 1.11	79.06 \pm 0.96	84.66 \pm 1.03	83.47 \pm 1.16
S. D.	1.33	1.16	1.33	1.42

Table 4: Morphological Classification of Cephalic Index among the Bini and Igbo tribes.

Class	Range	Bini tribe (260)		IGBO tribe (245)	
		Frequency	%	Frequency	%
Hyperdolicephaly	≤ 70.9	—	—	—	—
Dolicephaly	71 – 74.9	—	—	1	0.4
Mesocephaly	75 – 79.9	95	36.5	36	14.7
Brachycephaly	80 – 84.9	144	55.4	164	66.9
Hyperbrachycephaly	85 – 90.9	21	8.1	44	18
Ultrabrachycephaly	≥ 91.0	—	—	—	—

Fig. 1: The mean cephalic index values among Bini males and females between 11-25 years.

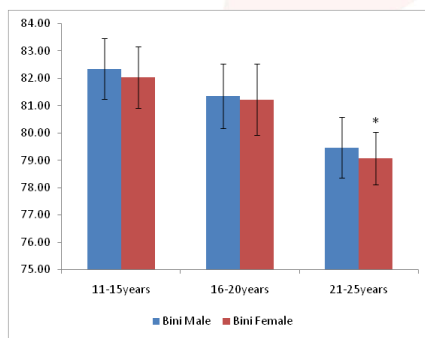


Fig. 2: The mean cephalic index values among Igbo males and females between 11-25 years.

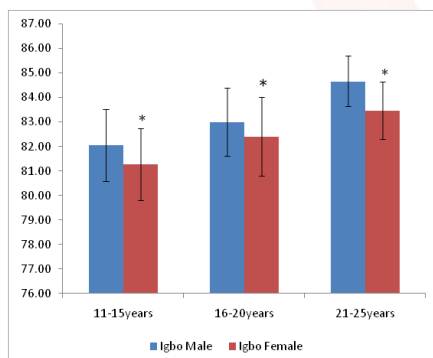


Fig. 3: The mean cephalic index values among Bini and Igbo male subjects between 11-25 years

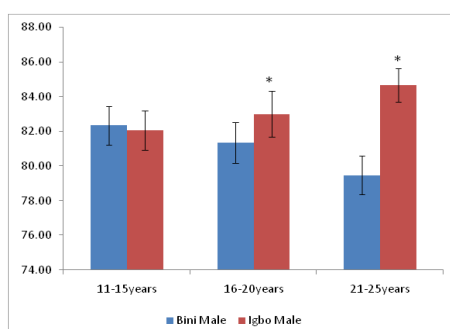


Fig. 4: The mean cephalic index values among Bini and Igbo female subjects between 11-25 years.

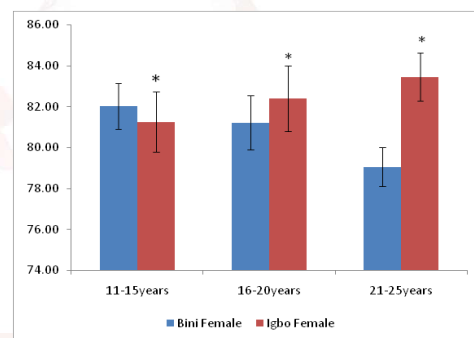


Fig. 5: The cephalic index values among Bini and Igbo tribe between ages 11-25 years.

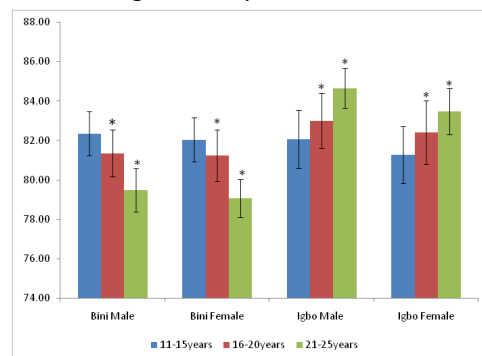


Fig. 6: Chart showing morphological classification of Cephalic Index among the Bini tribe.

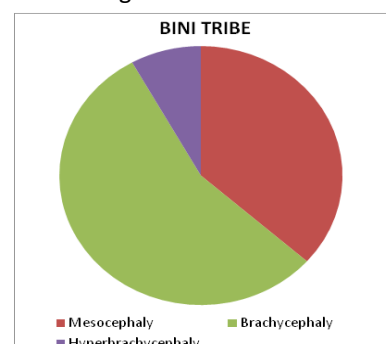
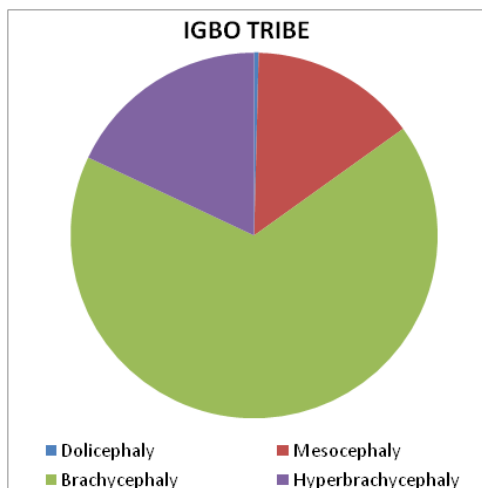


Fig. 7: Chart showing morphological classification of Cephalic Index among the Igbo tribe.



* represents level of significance i.e. $P < 0.05$.

DISCUSSION

The result of this study revealed intra-tribal sexual dimorphism of the cephalic index in both Bini and Igbo tribes and with increasing age, there is opposite progression in the cephalic index values in the two tribes (Figures 1 –5). The cephalic index value decreases among the male and female Bini subjects with increasing age and the cranial morphology showed gradual transition from brachycephaly to mesocephaly (Figure 1). On the contrary, the values increase with increasing age and the head form tends to grow towards brachycephaly among the male and female Igbo subjects (Figures 2).

This implied that with increasing age, an ethnic-based disparity occurs in the cranial morphology of the two tribes. Furthermore, there is an observable inter-tribal difference in the cranial morphology of the two tribes. Within ages 11-15 years, Bini male and female subjects have higher cephalic index values than their Igbo counterpart. The reverse is the case among age groups 16-20 and 21-25 years wherein the Igbo male and female subjects have significantly higher cephalic index values than their Bini counterparts (Figure 3 and 4).

This study also indicated comparative similarity and variation in the cranial forms of the Bini and Igbo tribes from those of other tribes and populations. Another study among male and female Gujarat students in India reported a slightly lower cephalic index values while another study done among the Onge males and

females reported similar cephalic index values with the result of this study [1,15]. The study among Turkman males reported a mean cephalic index (80.40 ± 4.0) which is similar to the values among Bini males but lower to those obtained among Igbo males [8]. Similarly, the cephalic index among Sistani (78.40) and Baluch (81.94) women were similar to those obtained among the Bini females (79.06) but significantly lower than the value for Igbo females (83.47) of corresponding age [7]. The cephalic index values reported among male and female Dangi and Ahiwar ethnic groups in India were significantly lower than values obtained for the male and female Bini and Igbo tribes in this study [16].

The cephalic index values among the Efik ethnic group in Southern Nigeria reported similar values with the result of this study while the values obtained among residents of Ovu community in Delta State of Nigeria reported a significantly higher value [17,18]. In both tribes of this study, brachycephalic head type is significantly prevalent (Figure 6 and 7). A study among the South Africans also showed the prevalence of brachycephaly, another study among Indians reported the prevalence of dolicephalic head type (58.5%) while the study of cephalic index among the Saudis reported that they are mostly hyperbrachycephalic [19-21]. However, the prevalence of brachycephaly was similarly reported in a comparative study of cephalic index between the Urhobo and Itsekiri tribes of Delta State, Nigeria [22]. This study showed the relevance of the cephalic index in the description of variation in cranial morphology across gender and in different tribes of human population.

Conflicts of Interests: None

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