Morphological Variability in Relation to the Cephalic Index in Urhobo's

*Enaohwo T.M[1]

[1]Department of Human Anatomy and Cell Biology, Delta State University, Abraka, Delta State, Nigeria

QR CODE

Website:http://ijfmi.com/

Doi: https://doi.org/10.21816/ijfmi.v4i2

[1]corresponding author email: enaohwotani@gmail.com

ABSTRACT

Introduction:

Craniofacial indices provide an objective anthropometric basis for the assessment of extant ethnic-based morphological variation in facial norms and features. Cephalic index (CI), the continuous variable that defines the linear craniometric relationship between head breadth and head length, carries a significant relevance in that direction.

Materials and Methods:

The current study is a descriptive one that aims at generating gender-specific mean CI values for a sample population of 200 pure breed Urhobo indigenes resident in the Nigerian Niger-Delta region

Results:

The male study population of 150 Urhobo subjects presented a mean CI of 81.5±5.2, as against 84.9±3.1 in the female sample population of 50 participants; these gender differences were statistically significant on *t*–test inferential analysis (p=0.03).

Conclusion:

Undoubtedly, the obtained study results as presented, with its comparative relevance, would stimulate substantial interest among physical anthropologists, practitioners of cosmetic surgery and other medical experts concerned with the development and application of scientific knowledge related to physical human variability.

Key words:

Cephalic index, Craniofacial indices, Urhobo

INTRODUCTION

In Physical anthropometric indices in the homo-sapiens species and her subspecies are notably dynamic in arithmetic value, varying significantly according to the dictating influence of genetic and environmental factors that bear a direct relationship with subjects' race, ethnicity, age, gender and geo-ecological conditions. This anthropologic statement of anthropometric characteristics appeared to be deeply appreciated and fully recognized by Anders Adolph Retzius, whose postulation of the craniometric theory of cephalic index led to the classification of crania into the dolichocephalic, mesocephalic and brachycephalic subtypes.

Distinguished both as a licensed doctor of medicine and as an Anatomist, Retzuis presented his cephalic index hypothesis to his supervisees at the Karolinska Institute as a scientific basis for objective craniometrical comparison, contrast and categorization.

Retzuis was also a polygenist who dedicated most of his craniometric research to the study of different skull types from different races, in their pioneering attempt to define and understand the origin of the races. Retzuis cranial index, as it is sometimes called, is a methodical expression in formula, of the linear craniometric relationship between two measured dimensions: the maximum cranial breadth and the maximum cranial length.

MATERIALS AND METHODS

Research ethical considerations

Ethical clearance for this descriptive study in craniometry was sought and obtained from the Ethics and Research Committee of College of Health Sciences, Delta State University, Abraka, Nigeria.

Community entry and Participants

An initiating step in data collection for the current quantitative study, community entry and participants' orientation, was carried out to raise the level of public awareness as it concerns the scope, aims and objectives of the study. Participants were encouraged to freely express their doubts and ask questions pertaining to the nature of the present research effort, after which a written consent was signed and/or thumb-printed.

For this cross-sectional study, 200 second generation Urhobo indigenes, resident in Ovu community for over a decade, were selected into the study sample. Absence of obvious signs and symptoms of congenital and acquired abnormalities with affectation of physical facial development was an absolute inclusion criterion. Congenital abnormalities considered in this category included Downs syndrome, Carpenters syndrome and Aperts disease etc. Provision of evidence in support of participants' age was also considered necessary for inclusion. All 200 participants were aged between 17 – 45 years with a gender distribution of 1: 4 (i.e. 150 male subjects as against 50 females).

Measurement of craniometric variable

All subjects selected for CI measurement were first placed comfortably in the sitting position. This was followed by selection of relevant craniofacial landmarks by gentle palpation.From before backwards, selected anthropometric landmarks include the summit of the glabella, the widest (lateral-most) diameter of the head and the opisthocranium.

Head length was measured as the distance between the glabella anteriorly and the opisthocranium posteriorly. For the head breadth, the widest diameter of the head at right angle to the median plane was measured using the sliding vernier caliper. Monopoly of craniofacial measurements was completely ruled out as all measurements were obtained in triplicates; consequently, only the average value was recorded as the true measure of the head length and breadth respectively. The CI was then calculated as the ratio of the obtained head breadth to head length, and expressed in percentage

Continuous Data Analysis

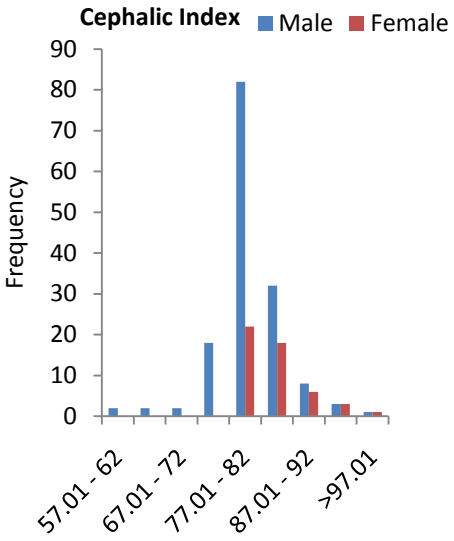
All collected data regarding obtained head length and head breadth in the current investigation were collated and subjected to descriptive and inferential analysis by a team of certified computer analysts and statisticians. The William S Gosset t-test statistical tool in the IBM Statistical Package for the Social Sciences, version 23, was used to establish significant sexual dimorphism a p–value set at ≤ 0.05.

RESULTS

Obtained mean value of cephalic index (CI), with standard deviation and related descriptive statistical data are presented in tables I for selected male and female Urhobo participants. Table II is a comparative presentation of CI angle from various other population groups.

Table I Minimum (min), maximum (max), mean values and standard deviation (SD) of cephalic index (CI)among sampled male and female Urhobo subjects

Variable	N	Min	Max	Mean with SD	*P*
Male Cephalic Index	150	57.9	96.9	81.5±5.2	0.03
Female Cephalic Index	50	75.8	99.4	84.9±3.1	0.03



Significant gender dimorphism selected at $p \leq 0.05$

Table II : Comparative data on cephalic index (CI) as reported in other sample populations.

Author (Date)	Population/ethnic group	Facial Angle
Al Guniad (2007)	Yemeni	91.0±3.0
Anibor and Okobiah (2013)	Itsekiris	83.4±4.1
Emad and Naif (2012)	Palestinians	92.2±4.1
Peck and Peck (1970)	Europeans	102.5±2.7
Sahr and Naif (2012)	Saudi Arabians	89.7±3.5
Shweta (1970)	Malwa	161.9±5,4

DISCUSSION

The results of the current cephalometric investigation indicate that Urhobo subjects are predominantly brachycephalic, as obtained cephalic index (CI) for the 1000 Urhobo subjects studied herein, showed a 54% prevalence of broad-headedness. The total populations' mean cephalic index of 83.1±4.1evidently places this Urhobo norm within the brachycephalic range, from 80.0–84.9. CI. A drop in CI from a mean value of 84.9±3.1 in the female study population to 81.5±5.2 in the male sample subset is evident on perusal of contents of Table 1 making the variable display female dominance herein. Cephalic indexes in the mesocephalic range were prevalent in39% of the sample population: only a 7% prevalence rate of dolicocephaly was observed.

A global trend towards brachycephalization and mesocephalizationis apparent on review of CI values reported by Shah and Jadhav[7] and Golalipour[8] for Mumbai subjects in Indian and, a Turkish population, in that order. In his 2006 cross-sectional study to determine the ethnic effect on CI values, Golalipour subjected 410 normal 17 – 20 year old female participants to cephalometric analysis in Gorgan, Northern Iran. Mean CI was 82.8±3.6 and 85±4.5 in

the Turkman and Native Fars groups respectively. In contrast with Golalipours single gender study, Shah and Jadhav's male and female gender cephalometric investigation of Mumbai students, aged 17-23 years, produced results in the brachycephalic range for male volunteers (81.28), and within mesocephaliclimils, for female participants, with obtained CI of 75.22.

Comparative analysis of existing literature from diverse geo-ecological settings tend to suggest an intimate reciprocal relationship between brachycephalization and mesocephalization such that brachycephalic head types are closely followed in prevalence, frequency and dominance by mesocephalic medium heads, and vice versa. Mesocephalic heads dominate the craniometric anthropologic maps in studies and reports authored by Kumari *et al.*[11]and Swapnali, [9] to determine the most prevalent head type in 280 Andhra Pradesh Indians and 100 Mumbai students respectively. A total of 31.4% of the 170 male subjects investigated in the Kumari research series were mesocephalic followed by a male brachycephalic prevalence of 23.5%. This prevalence trend is reversed among the 110 female subjects recruited into the Kumari study where 26.4% brachycephalic female heads and 10% mesocephalic female heads were observed. Of the 50 male students evaluated in the Swapnali*et al.* study series of 2011, 20 subjects (40% of sample population), were mesocephals, while 6 female subjects (12%) showed CI values in the brachycephalic range. The mean cephalic index in both sexes was 78.48, ranging from 62.90 to 103.30.[9]

In line with the arguments associated with the "nature versus nurture" debate, aetiological factors underlying the reported variation existing in mean CI values as presented herein, are multifaceted, ranging from acquired geo-ethnic influences (exemplified by Urhobo land, Urhobo people and Urhobo ethnicity), through hereditary gender considerations (observed in feminine versus masculine dimorphism) to age-related factors, among others.

Conclusion

While recommending further, and accelerated international commitment to practical growth and development of anthropometry from its somewhat academic and rudimentary stage in Nigerian, it may be concluded that from research findings presented herein, that the cephalometric measure, cephalic index, shows significant variability along ethnic, gender, ecological and age-related lines.

REFERENCES

1. Aweto A., (2002). Outline Geography of Urhobo land. Urhobo Historical Society. Available at http//www.waado.org/ geography/Urhobogeography.Aweto.html
2. Ziogas IA; Triarhou LC (2016). Anders Retzius and his gyri. Neurol Sci. 2016 Nov;37(11):1861-1866. Epub 2016 Jul 20.
3. Larsell O. Anders A. Retzius (1796-1860). Annals of Medical History, Published by PAul b. Hoeber, Inc. New York. Vol. VI, No. I, Pp. 16-24
4. Erik Müller (1910). Anatomical Institution in Stockholm 1756-1910. Karolinska Medico-Surgical Institute's History, III. Stockholm, 1910: 94-122.
5. OlofLarsell (1924). Anders Adolf Retzius (1796-1860). Annals of Medical History, March 1924, 6 (1): 16-24.
6. Peter Rowley-Conwy (2007). From Genesis to Prehistory: The Archaeological Three Age System and its Contested Reception in Denmark, Britain, and Ireland. p. 120
7. Shah GV, JadhavHR (2004) . The Study of Cephalic index in Students of Gujarat J.Anat.Soc.India 53 (1)25-26
8. Golalipur MJ (2006). The effect of ethnic factors on cephalic index in 17–20 years old females of North Iran. Int J Morph, 24(3), 319–322.
9. Swapnali Khair, Deepika Bhanderi, Swati Wavhal (2011). Study of Cephalic Index among the Students of Mumbai Region. Int. J. App. Res. 3(1), 64-66 K.
10. Ekeh, Peter (2005). *Studies in Urhobo culture*. Buffalo: Urhobo Historical Society. p. 2.
11. Lakshmi Kumari, Vijaya Babu, KusumaKumari, Nagamani M.(2015). A study of cephalic index and facial index in Visakhapatnam, Andhra Pradesh, India. Int J Res Med Sci. 2015 Mar;3(3):656-658