



HEAD LENGTH, HEAD BREADTH AND CEPHALIC INDEX: A CRANIOMETRIC STUDY AMONGST THE URHOBO ETHNIC GROUP IN DELTA STATE OF NIGERIA.

¹*Yorkum L. Kenneth and ²Gbeneol J. Tombari

¹Department of Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, University of Port Harcourt, Nigeria.

²Department of Surgery, University Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria.

*Author for Correspondence: Yorkum L. Kenneth

Department of Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, University of Port Harcourt, Nigeria.

Article Received on 15/05/2017

Article Revised on 05/06/2017

Article Accepted on 26/06/2017

ABSTRACT

The aim of this research study was to determine the cephalic indices amongst the Urhobos in Delta State, Nigeria. Five hundred (500) subjects of ages 18-30 years were selected by random sampling in different villages for physical examination, all measurements were taken with the subject in a relaxed sitting position with the head in an anatomical position. The measured parameters were morphological f head length and breadth. The standard spreading caliper with scale was used for the measurement of cephalic parameters. The cephalic index was head breadth divided by the head length and multiplied by 100. The results showed that the total mean cephalic index was 76.86. Males had a cephalic index of 79.31, while females had a cephalic index of 93.60. Based on this study, 78.68% of individuals were mesocephalic, 11.4% dolichocephalic, 9.0% brachycephalic, 0.43% hyperbrachycephalic, This research showed that the urhobos are significantly mesocephalic and dolichocephalic. The obtained data in this study may be useful in anthropological and forensic research, medical and clinical practices (facial reconstruction).

KEYWORDS: Anthropometry, Urhobos, cephalic index, maximum head length, maximum head breadth, Cephalic phenotype.

INTRODUCTION

The cephalic index or cranial index is the ratio of the maximum width of the head of an organism multiplied by 100 divided its maximum length (i.e.in the horizontal plane, or front to back) Cephalic index utilizes the length and breadth of the head which are useful measurement in the study of secular trend in the size and the shape of the skull (Larsen, 1997; Kouchi, 2002). Change in diet from harder to softer foods has had a significant effect on the morphology of the cranium. Studies in experimental animal, living persons eating hard and soft diets and number of Archaeological finds where dietary change is well documented, showed and the profound influence of masticatory stress on head shape and morphology (Larsen, 1997; Carlson and Gerven 1977). However, determination of cranial index from the skeleton would require adjustment to the value to compensate for the absence of cranial soft. Change in cephalic index with increasing age of fetus has been reported (Gray *et al.*, 1987). Cephalic index is the commonest cephalometric parameter that has been used for adult population studies in Nigeria (Obikili *et al.*, 2004; Oladipo and Olotu, 2006). Cephalic index can be grouped into four international categories namely; dolichocephalic

(<75), mesocephalic (75-79.9), brachycephalic (80-84.9), and hyperbrachycephalic(85-89.9) (Golalipour *et al.*, 2007).

The aim of this study is to establish and document the cephalic indices of Urhobos in Delta State of Nigeria.

MATERIALS AND METHODS

This study was carried out amongst the Urhobo ethnic group in Delta State of Nigeria, consisting of 250 males and 250 females, summing up to 500 subjects aged between 18-30 years. The subjects were selected at random. All subjects had normal and healthy cranial structure.

Using a spreading vernier caliper, the head length and head breadth were measured and the cephalic index calculated thus;

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

The maximum Head Length (mHL) was measured by the means of spreading caliper, from the glabella to the opisthocranium.

The maximum Head Breadth (mHB) was measured as the maximum transverse diameter between two fixed points of the parietal bone. All measurements were taken with the subject in a relaxed sitting position with head in an anatomical position.

Statistical Analysis

The data collected were analyzed to obtain Mean,

Standard Deviation, Standard Error values and range. Z-test was used to determined sexual dimorphism.

RESULTS

The results obtained are represented in tables 1-4 below for males, female and total subjects (samples size) collected from the Urhobo tribe in Delta State, Nigeria.

Table 1: Mean and Standard Deviation (SD), Standard Error (SE) and range of Maximum Head Length (MHL), Maximum Head Breadth (MHB) and Cephalic Index (CI) in Urhobo male subjects.

Parameters	MHL	MHB	Cephalic Index
Mean	18.14	14.73	79.31
Standard deviation	0.58	0.9	2.44
Standard Error	0.06	0.25	0.16
Sample Size	250	250	
Range	18.00-18.99	14.00-14.99	75.00-79.99

Where the mean for maximum head length was 18.14, mean maximum head breadth was 14.73 and mean Cephalic Index was 79.31.

Table 2: Mean and standard deviation (SD) standard and error (SE) of maximum head length (MHL), maximum head breadth (MHB) and Cephalic index(CI) for Urhobofemales.

Parameters	MHL	MHB	CI
Mean	17.75	13.95	78.60
Standard deviation	0.78	2.16	2.70
Standard Error	0.07	0.04	0.17
Range	18.00-18.99	13.00-13.99	75.00-79.99

Where the Mean maximum head length was 17.75, Mean Maximum Head Breadth was 13.95 and Mean Cephalic Index was 78.60.

Table 3: Mean and standard deviation (SD) standard and error (SE) of maximum head length (MHL), maximum head breadth (MHB) and Cephalic index(CI) for both Urhobomales and female.

Parameters	Male	Female	Total-both male and female
MHL (cm±SD)	18.14±0.58	17.75±0.78	17.29±0.28
MHB (cm±SD)	14.78±0.9	13.95±2.16	14.28±2.80
CI (cm±SD)	93.31±2.44	78.60±2.70	93.31±4.62

For all subjects the mean values for the (MHB),(MHL) and (CI) were 14.05cm, 18.18cm and 76.86 respectively.

Table 4 showed Z-test analysis with statistically significant value obtained for the. All the subjects, the mean values for the maximum head length breadth,

maximum head length and cephalic indices were 14.05cm, 18.18cm and 76.86 respectively. On a final analysis, based on the baseline values, 78.6% of subjects were mesophylic, 11.4% dolichocephalic, 9% brachycephalic and 0.4% hyperbrachycephalic.

Table 4: Z-Test table for cephalic index between males and females of Urhobos.

Parameters	Z-cal	z-Critical	Interference
CI	3.08	1.96	Significant

The mean cephalic index calculated from the z-test analysis showed sexual dimorphism amongst the Urhobos in Delta State of Nigeria as shown in table 4.

DISCUSSION

This study showed that the cephalic index of male was

significantly higher than those of the females ($p=0.03$), which agrees with sexual dimorphism as reported by Olotu *et al.*, (2006).

Oladipo and Olotu determined the cephalic index for ijaw male and female as 80.98 and 78.24 respectively.

They also worked on the cephalic index of Igbo male and female as 79.09 and 76.83 respectively. Their findings were higher than that of the present study. The reason for this, is not clearly known, but may be due to environmental, genetic, or nutritional causes.

The studies carried out by Oladipo and Olotu on the cephalic indices of Ijaw male and female indicated that it fell into the brachycephalic group and mesocephalic group respectively, while the Igbo males and females fall into the mesocephalic group (Oladipo *et al.*, 2006).

Cephalic indices from the present study were lower than the cephalic indices documented by Shah and Jadhav (Shah *et al.*, 2004) study in India and Delsol (Del Sol, 2005) in Chile. Cephalic indices from present study were also lower than in native males with 84.8 (Golalipour *et al.*, 2008).

In the present study, it was observed that there was gender difference with males having a higher cephalic index compared to females. The reason for the difference are not clear, but may be attributed to the effect and interplay amongst growth, thyroid and sex hormones. Investigation carried out on the Nepal revealed a significant gender difference (Lobo *et al.*, 2000) with male having cephalic index of 83.1 which is lower than females with cephalic index of 84.6. This implies that cephalic index can be higher in any sex depending on the peculiarity of the population under study.

In the present study, the dominant type of head shape was mesocephalic (78.6%), this finding is similar to another studies in Del Sol, Chile, Bhargav and Kher study in Central India (Bhargav *et al.*, 1960), Oladipo's study of Igbo-tribe of Nigeria (Oladipo *et al.*, 2006) and Fawehinmi study in Port-Harcourt, Nigeria (Fawehinmi *et al.*, 2008). Dominant type of head from this study is not similar to a study in India (Bhatia *et al.*, 1995) in which 58.5% of population was dolichocephalic. Thus male and female in this study belong to the same tribe in Nigerian and have the same origin but there is a significant difference between their cephalic indices. However, both genders were said to be mesocephalic. The results of this study are expected to be of importance to anthropologist and forensic scientist and in clinical practice as in cephalopelvic disproportion (CPD) and craniosynostosis. It may also serve as the basis of comparison for further studies on other Nigerian ethnic groups or minority tribes (Babatunde, 2004). Further studies on gene variation are required to ascertain the specific genetic factors responsible for differences in cephalic indices among sexes, tribes and races.

It will also be important to note that developmental factor could differ in different races. The closure of major sutural points during development in infants may vary significantly in different races which may lead to either an over-all increase or decrease in head length or head breadth in an adult.

CONCLUSION

This study showed a significant increase in mesocephaly and dolichocephaly and a significant decrease in brachycephalization process amongst the Urhobos of Delta State of Nigeria. The data obtained in this study may be useful in anthropological research, forensic, genetic research as well as medical clinical practice.

CONFLICT OF INTEREST

I want to state categorically that there is no conflict of interest.

REFERENCES

1. Babatunde O.A (2014). "Measurement of cephalic index in order children and adolescents of Nigerian Population". *Bio Med Research International*, 14: 3-5.
2. Bhargav T., Kher G.A.(1960). "An anthropometry study of central India, Bhol of Dhan District of Madhya Pradesh". *Journal of the Anatomical society of India*, 9: 14-19.
3. Bhatia M. Thin J., Debray H., Cabanes J. (1995). "Etude anthropologique et memories de la societe d' anthropologiqu de pari, 10: 199-213.
4. Baral P, Lobo SW, Menezes RG, Kanchan T, Krishan K, Bhattacharya S., Hi remath SS(2010). An anthropometric study of facial height among four endogamous communities in the Sunsari district of Nepal. *Sigapour Med J*, 51(3): 52-56.
5. Carlson D.S., Van Gerven D.O. (2003). "Masticatory function and post-pleistocene evolution in Nubihf". *The internet Journal of Biological Anthropology*, 1: 8-12.
6. Del Sol M. (2006). "Cephalic index in a group mapuche individuals in the ix region of Chile." *international Journal of Morphology*, 23(3): 241-246.
7. Fawehinmi H.B., Osunwoke A.E., Ligha A.E., Indices of normal growing children and children with sickle cell anaemia in Port Harcourt". *Journal of Experimental and clinical Anatomy*, 7(1): 27-29.
8. Golalipour M. J, Jahanshahi M and Haidari K (2007). Morphological Evaluation of Head in Turkman Males in Gorgan-North of Iran. *Int. J. Morphol*, 25(1): 99-102.
9. Gray DL, Songster GS, Parvin CA, *et.al.* (1987). Cephalic index: A Gestational age- dependent Biometric Parameter. *Obstet Gynecol.*, 74: 600-603.
10. Larsen S.C (1997). *Bioarchaeology Interpreting Behaviour from the Human Skeleton*, (Ed). Cambridge University Press, 1-240.
11. Lobo S.W., Chandrashekhar W. S., Kumar S.C.(2000). "Cephalic index of Gurun community of Nepal anthropometric study; Kathmandu University Medici Journal, 3: 263-276.
12. Obikili, E.M., C. Ohaegbulem, T.B. Ekanem, U. Aligwe Kweand S.P. Singh (2004). Cephalic Index in a Young Adult Nigerian Population. *J. Exp. Clin. Anat*, 3(2): 4-7.
13. Oladipo G.S., Olotu J.E. (2006). "Anthropometric comparison of cephalic indices between the Ijaw and

- Igbo tribe. *Global jpure Applied sci*, 12(1): 137-138.
14. Oladipo G.S, Olotu E.J.(2006) "Anthropometric comparism of cephalic indices between the Ijaws and Igbo tribe." *Global Journal of morphology*, 23(3): 241-246.
 15. Olotu E.J., Eroje A., Oladipo G.S., Edibamode E. (2009). "Anthropometric study of the facial and nasal length of adult igbo ethic group in Nigeria". *The internet Journal of Biological Anthropology*, 2: 80-87.
 16. Shah G.V., Jadhav H.R. (2004). "The study of cephalic indexin students of Gujaret". *Journal of the Anatomical society of India*, 53(1): 25-26.