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Anthropometric study of cephalometric indices among Idoma and Igede ethnic groups of Benue State, Nigeria

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ABSTRACT

Background: Anthropometric variables are important biometric characteristics that varies with age, sex, and tribe. **Aim:** Following the paucity of research in cephalometry as subdivisions of biological and forensic anthropology, this study was undertaken due to lack of adequate cephalometry among Nigerians. **Methods:** Four hundred and twenty five subjects were used for the study of which 158 were Igede and 267 were Idoma with mean age of 22.6 0.45 and 23.0 0.47 year respectively. The anthropometric variables measured were head length, head width, bizygomatic distance, upper facial length, lower facial length, total facial length, nose width and skull height from which the cephalometric indices were calculated. **Result:** The result showed that there were statistically significant differences ($P<0.05$) in some of the measured variables between the Igede and Idoma tribes of Benue State as head length, head width. The result also showed a positive correlation between the head width and bizygomatic distance and other anthropometric variables which could be used to predict cephalic indices among the Igede and Idoma ethnic groups of Benue State, Nigeria. These results showed that the dominant head form among the Idoma and Igede Ethnic groups were mexocephalic respectively. Facial indices showed dominant hypereuriprosopic face. **Conclusion:** The present study could be used in forensic anthropology, establishing ancestral relationship and reconstructive surgeries of the face, head and neck of the two ethnic groups of Idoma and Igede of Benue State in north-central of Nigeria.

Key words: Anthropometry, cephalometry, dimorphism, indices, Benue, Nigeria

INTRODUCTION

No two individuals are exactly alike in all their measurable traits, even genetically identical twins (monozygotic) differ in some respects.[1] These traits tend to undergo changes in varying degrees from birth to death, in health and disease, and since skeletal development is influenced by a number of factors producing differences in skeletal proportions between different geographical areas, it is desirable to have some means of giving quantitative expression to variations which such traits exhibit.[1] Anthropometry means the measurement of human beings, whether living or dead or on skeletal material.[2] The use of anthropometry and cephalometry in the field of forensic science and

medicine dated back to 1882 when Alphonse Bertillon, a French police expert invented a system of criminal identification based on anthropometric measurements such as head length and facial indices.[3] His system explained the extreme diversity of dimensions present in the skeleton of one individual compared to those using simple constructed calipers.[3] As anthropometry is an important part of biological/physical anthropology, hence the persons specializing in anthropometry are familiar with range of biological variability present in the human populations and its causes, and are well trained in comparative osteology, human osteology, craniometry, osteometry, racial morphology, skeletal anatomy and function.[4,27]

Anthropometric characteristics have direct relationship with sex, shape and form of individuals, these factors are intimately linked with each other and are manifestation of the internal structure and tissue components that are influenced by environmental and genetic factors.[5,6,28] Anthropometric data are believed to be objective and allow the cephalometric examiner to go beyond subjective assessment.[7,8,27] Anthropometry can be subdivided into somatometry, cephalometry and osteometry. Somatometry is useful in the study of age estimation from different body segments in a given set of individuals.[9,10] Anthropometry is being used more often in sexing the skeletal remains, such as the determination of sex from variety of human bones including skull, pelvis, long bones, scapula, clavicle, and metatarsals, metacarpals, phalanges, patella, vertebrae, and ribs.[10] Today, anthropometry plays an important role in industrial design, ergonomics and architecture where statistical data about the distribution of body dimensions in the population are used to optimize products.[11,12]

Today, ergonomic professionals apply an understanding of human factors to the design of equipment, systems and working methods in order to improve comfort, health, safety, and productivity.[8] This includes physical ergonomics in relation to human anatomy, physiological and biomechanical characteristics.[9] Also, cognitive ergonomics in relation to perception, memory, reasoning, motor response including human–computer interaction, mental workloads, decision making, skilled performance, human reliability, work stress, training, and user experiences.[13] Previous research findings put it that when anthropometry is combined with clinical methodology had produced knowledge on craniofacial framework and features that existed in various ethnic groups.[8] It is on this note that treatment of congenital anomalies on the face and head are established which had helped to create craniofacial databank on anomalies.[14]

The used of this study for reconstructive surgery, forensic examinations in crime scenes and establishing racial differences along geographical locations cannot be over emphasized.

METHODOLOGY

Study location

This research work was carried out in Benue State, the food basket of the nation, Nigeria in Africa. The state has three major ethnic groups known as Igede, Idoma and Tiv. There is peaceful co-existence among other tribes like Igala from Kogi, Hausa from Kaduna, Yoruba from Western part of Nigeria. The present study was school-based carried out in two schools as; Oju College of Education (OCE) and Jesus College Otukpo (JCO). The study subjects were normal and randomly selected Idoma and Igede people who are residents of the Benue state, north-central area of Nigeria.

The tools used for this research include; transparent graded ruler and measuring tape for the measurement of nasal width, while Gliding and sliding machine or caliper (GSM) were used for the measurement of head length, head width, skull height, upper facial length, lower facial length and total facial length measured to the nearest unit in millimeters (mm). The four hundred and twenty five subjects for this study were recruited by giving them an inform consent form which contained their demographics as follows; the age in years, names, place of birth, local government area and parents by their respective class representatives filled into the questionnaire. Also the subject data were later transferred to spreadsheet for statistical analysis using student t-test regression It is a descriptive statistics in cross-sectional procedure conducted in August, 2014 with the sample size determined using and the anthropometric methods as follows:
N = $Z^2 Pq/d^2$[15]

Anthropometric measurement

1. Head length was measured to the nearest millimeters (mm) using gliding and sliding caliper with subject seated and head positioned in an upright direction. The head length was measured from the two extreme ends of the sagital axis of the head region using the Anatomical Standard Record of Position such as Frankfurt Plane[10]. Head length is the maximum point on the sagital axis of the skull as shown in figure 1.

2. Head width was taken from the subject using gliding caliper measured in to the nearest millimeters (mm) when the head is in anatomical position using the Frankurt plane placed from the two extreme ends of parietal axis around the skull[10]. Head width is the maximum point of biparmetal axis around the skull as shown below.

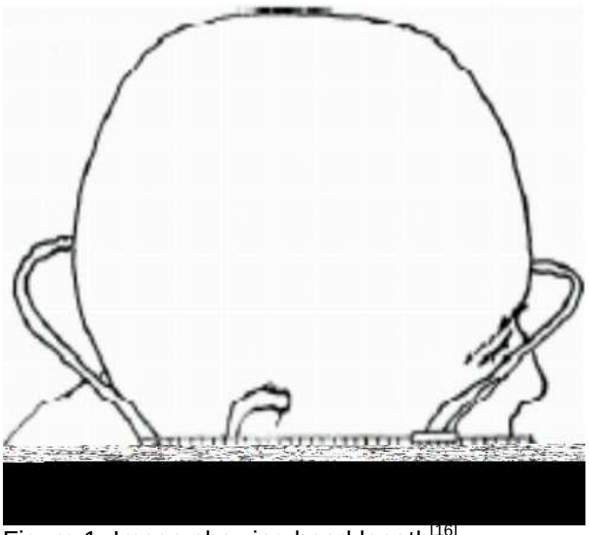

Figure 1: Image showing head length[16]

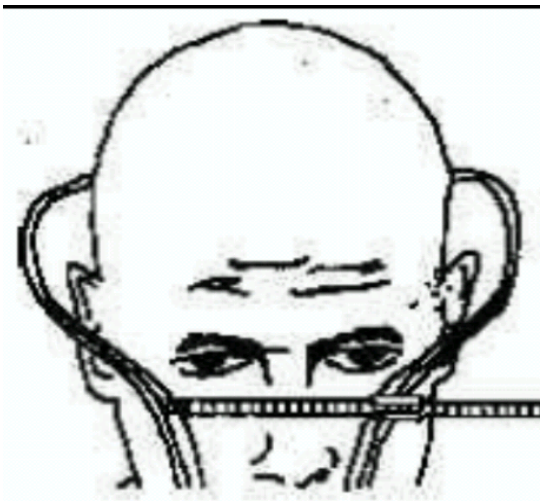

Figure 2: Image showing head width[17]

3. Bizygomatic distance was taken when the subject is seated with the head position upward and raised to a certain comfortable degree where sliding caliper was used to nearest millimeters (mm) from the two extreme lateral ends of the zygomatic bones around the face. Bizyomatic distance is the facial distance or width which is the maximum distance between the two lateral sides from zygomatic bones as it is shown below.

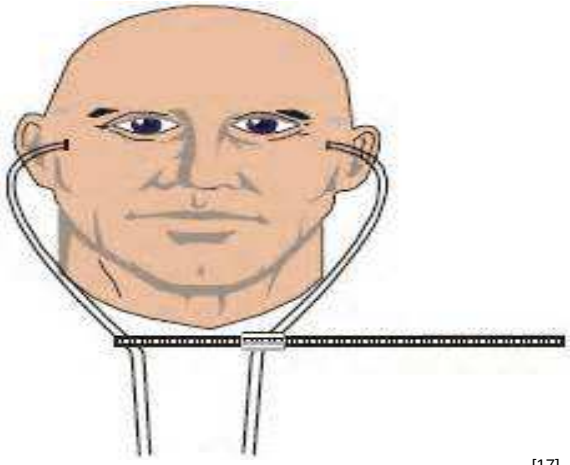

Figure 3: Image showing bizygomatic distance[17]

4. Skull height was measured with the head in anatomical position using Frankfurt plane with gliding caliper spread from the maximum point of the skull to the root of the nose and measured in millimeters (mm) to the nearest point. Skull height: this is also called the forehead which is the maximum distance from the root of the nose to the highest point of the head as it is shown.

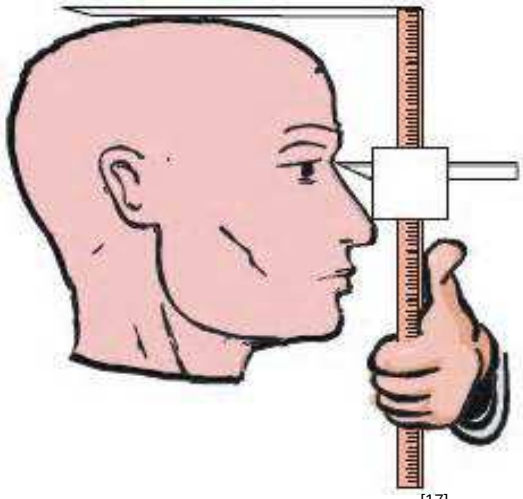

Figure 4: Image showing skull height[17]

5. Upper facial height was measured using sliding caliper when the head of the subjects is placed upright in tilted neck so that the caliper measured to the root of the nose from lower portion of zygomatic bones in both sides all measured to the nearest millimeters (mm). Upper faced height- this is the measurement also called nasal length

which is the distance from the root of the nose is the base of the nose.

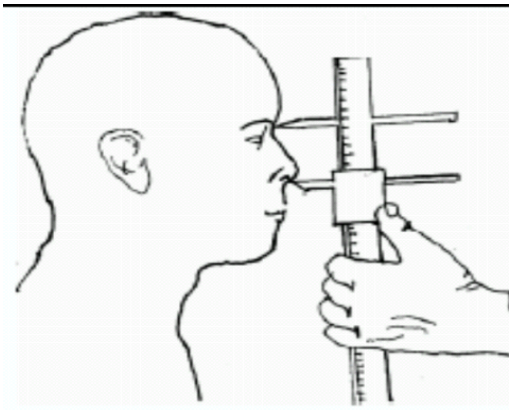

Figure 5: Image showing upper facial height[16]

6. Lower facial length was measured to nearest millimeters (mm) using sliding caliper measured from the lower jaw region at the point of mentalis prominence to the root of the nose as shown in Figure 6. Lower facial length is the measurement of the distance from the root of the nose to mental portion on the lower jaw (mandible).

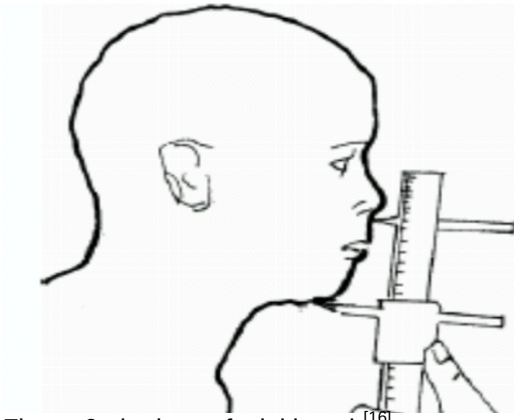

Figure 6: the lower facial length[16]

7. Facial Height was measured to the nearest millimeters (mm) using sliding caliper when the head was in anatomical position at Frankfurt Plane from the lower portion of the mandible to the root of the nose as shown in Figures 5 and 6. Facial height (total) is the total distance from the root of the nose to the lower border of jaw (mandible).

8. Nose width was measured as the distance between two alae of the nose using sliding graded transparent ruler to the nearest millimeters (mm). Nose width is the total distance between two alae of nose.

9. Nose length was taken when the subject is seated with the head placed in anatomical position and raised to a certain comfortable degree where sliding caliper was used to nearest millimeters (mm) from the two extreme lower base of the nose and to the root of nose. Nose length is also called upper facial length which is the maximum distance from the root of the nose.

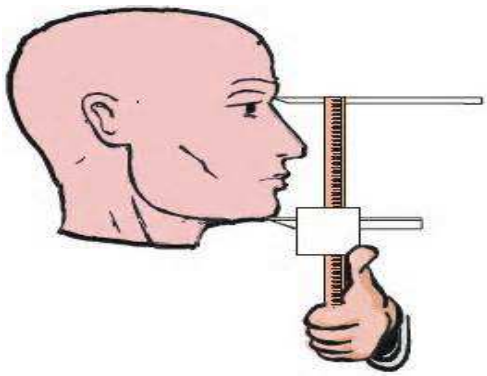

Figure 7: Image showing the total facial length[17]

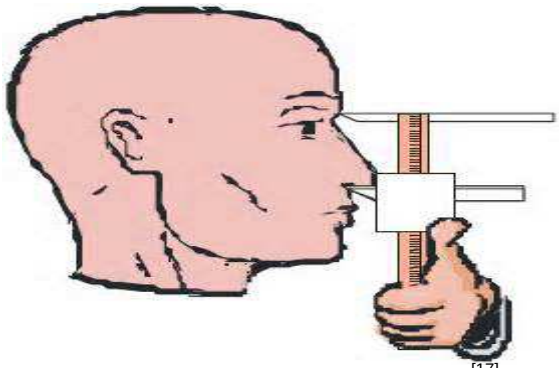

Figure 8: Image showing the nose length[17]

Ethical consideration

An introductory letter was obtained from the Department of Human Anatomy, Ahmadu Bello University Zaria and was submitted to the Principal and Provost of Jesus College, Otukpo and College of Education, Oju in Benue State, Nigeria. The study was approved by the Postgraduate Ethical Committee of Ahmadu Bello University Teaching Hospital (ABUTH-Shika). Informed consent was also obtained from each participant before questionnaires were administered.

RESULTS

Four hundred and twenty five (425) subjects which composed of 158 Igede and 267 Idoma, with their percentages as 37.2% and 62.8% respectively. The sample population as shown in table 2 was further

subdivided into sex where Igede tribe had 75 males and 83 females while Idoma tribe had 129 and 138 respectively. This difference in populations among the tribes was because of more local government areas in the later than former. Table 1 shows the international classification standard of cephalic indices using cephalometric parameters[28] from table 1, long head called dolichocephalic (70-74.9), moderate head called mesocephalic (75-79.9), short head also called brachycephalic (80-84.9) and very short head hyperbrachycephalic (85-89.9) respectively. Here, cephalic index for Igede is higher than Idoma but both belong to moderate head presentations. Also the nasal length among the two tribes were the same in values as 24.6 as shown.

Table 3 shows general descriptive statistics of cephalometric parameters among Igede and Idoma tribes in which the head length and head width were significant in values as; 77.08±1.10** and 59.0±1.30** among Idoma while upper facial length, total facial length and nose width were: 46.0±2.70*, 88±5.12* and 11.32* for Igede respectively. Table 4 expressed SEM of cephalometric parameters among tribes of Igede males that were significant as: bizygomatic distance 67.9±2.60* and 11.32±0.43* while Idoma males were: 42.50±1.00**, 79.3±1.10** and 62.2** for head length and head width respectively.

Also in table 5 showed SEM of Igede females in significant values in nose width and skull height as: 11.31±0.35 and 156.8±5.40 while lower facial length 86.10±2.00**, head length 79.3±1.10** and 63.2±1.40** for Idoma females respectively. Also, in table 6 showed cephamotric indices obtained from various parameters among Igede and Idoma with cephalic indice, upper facial indice higher among the later tribe. Table 7 and 8 expressed simple linear correlation and linear regressions with positive and negative presentations. It also shows positive correlation in skull height, bizygomatic distance with head width among the two tribes of Benue state, Nigeria. The cephalic indice showed associations in head length, head width, skull height and nose width among Igede and Idoma ethnic groups of Benue State, Nigeria.

DISCUSSION

In our study, the knowledge of cephalometric indices to predict sex, race and geographical locations commiserated with anthropometric presentations of Igede and Idoma ethnic groups of Benue State, Nigeria. This is in correlation with the work[9] in which cephalic indices among Ibibios was in mexocephalic form. Results of the present study using cephalometric indices namely the head length, head width, age, bizygomatic distance, upper facial, lower facial length, total facial length, nose width and skull height can be successfully used to predict anthropometric relationships between the two ethnic groups.[18,19,20]. Some of the parameters studied showed statistical significant difference between the two tribes of Igede and Idoma ethnic groups of Benue State, Nigeria. This study indicated that the human body dimensions are affected by ecological, biological, geographical, gender, age and ethnic groups, are major determining factors for head dimensions.[17,21] The present cephalometric study among the Igede and Idoma ethnic groups of Benue state, Nigeria was compared which agreed with some scholarly knowledge as follows:[22,23] comparison of craniofacial indices among tribes of Gombe state, Nigeria with higher head length, width and nasal length,[23] in morphological evaluation of head and face shapes in a North-Eastern Nigerian population but lower in skull height than the present work and,[24] studied the cephalofacial indices among young students of Western Europe. Other reviews in comparison with the present study were craniofacial indices in Lagos Western region of Nigeria but with higher values in upper facial length than that obtained in Igede females[5,25] studied craniofacial indices in Maiduguri Northern part of Nigeria,[26] in comparative study of Cephalic indices amongst Ibibios with Efiks while[27] studied the comparison of cephalometric indices between the Hausa and Yoruba ethnic groups of Nigeria and the last but not the least was[28], cephalometric indices in Kano State of Northern Nigeria.

There existed the same cephalic form of head among Igede and Idoma ethnic groups of Benue state as mexocephalic which agreed with work[28] even though had a higher values in head length and width among Kano indigenes.

CONCLUSION

Our study on anthropometry and cephalometry as indices had clearly expressed in age, sex and tribe in similarities and should be encouraged in determining tribal settings among populations. People were believed to have common origin using facial presentations in anthropometric analysis as the present study had shown. The study showed predominantly similar mexocephalic and

hypereurosopic head and face among Igede and Idoma ethnic groups of Benue State, Nigeria which helped in the present and futuristic events in crime, disputes and ancestral relationship.. There exist sexual dimorphic features and the ancestral relationship investigated with similarities in cephalometric indices among Igede and Idoma ethnic groups of Benue.

Table 1: International Classification Standard of head types[27]

Head shape	Cephalic index (CI)	Range
Dolicocephalic (Long head)	>70	70-74.9
Mesocephalic (Moderate head)	>75	75-79.9
Brachycephalic (short head)	> 80	80-84.9
Hyperbrachycephalic (very short head)	> 85	85-89.9

Table 2: Frequencies by sex and tribe of cephalometric parameters among the Idoma and Igede ethnic groups of Benue State, Nigeria

TRIBE	MALE	FEMALE	COUNT	PERCENT
IGEDE	75 (47.5%)	83 (52.5%)	158	37.1
IDOMA	129 (48.3%)	138 (51.7%)	267	62.8
TOTAL	204 (48.0%)	221 (52.0%)	425	100

Table 3: Cephalometric parameters of Igede and Idoma ethnic group of Benue State, Nigeria

VARIABLES	IGEDE (Mean±SEM)	RANGE	IDOMA Mean±SEM	RANGE
AGE (years)	22.6±0.45	17—40	23.0±0.47	17—40
Head length (mm)	75.0±2.40	22—168	77.08±1.10**	34—196
Head width (mm)	55.0±2.60	13—137	59.0±1.30**	12—130
Bizygomatic Dist.(mm)	66.9±2.50	14—126	66.95±1.31	13—109
Upper Facial Length	46.0±2.70*	10—89	42.36±1.21	10—98
Lower Facial length	42±2.50	12—137	42.50±1.00	12—120
Total Facial length(mm)	88±5.12*	32—189	85.20±2.21	35—137
Nose Width (mm)	11.32±0.4*	4.0—24	10.08±0.19	5.0—21
Skull Height (mm)	151.90±3.40	87—267	152.10±2.4	74—37

*$P \leq 0.05$ shows statistically significant value among Igede ethnic group

Table 4: Cephalometric parameters of Igede male and Idoma male ethnic group of Benue State, Nigeria

VARIABLES	IGEDE MALE Mean±SEM	RANGE	IDOMA MALE Mean±SEM	RANGE
AGE (years)	22.4±0.47	17–40	22.6±0.47	17–40
Head length (mm)	68.0±2.40	21–167	79.3±1.10**	36–195
Head width (mm)	55.0±2.60	15–133	62.2±1.30**	14–130
Bizygomatic Dist.(mm)	67.9±2.60*	14–126	66.8±1.31	13–129
Upper Facial Length	46.0±2.70	10–80	45.9±1.21	11–88
Lower Facial length	23.1±2.70	12–137	42.50±1.00**	12–120
Total Facial length(mm)	69.1±5.10	32–187	87.50±2.20	35–137
Nose Width (mm)	11.32±0.43*	4.0–24	9.20±0.19	5.0–21
Skull Height (mm)	151.90±3.40	86–268	151.10±2.4	74–237

*$p \leq 0.05$ shows statistically significant differences among Igede Males in Benue State

**$p \leq 0.01$ shows high significant values among Idoma Male tribe of Benue State, Nigeria

Table 5: Cephalometric variables of Igede female and Idoma female tribes of Benue State, Nigeria

VARIABLES	IGEDE FEMALE Mean±SEM	RANGE	IDOMA FEMALE Mean±SEM	RANGE
AGE (years)	22.41±0.46	17–40	22.9±0.47	17–40
Head length (mm)	73.4±2.40	21–167	79.3±1.10**	36–195
Head width (mm)	58.3±2.22	15–133	63.2±1.40**	14–130
Bizygomatic Dist.(mm)	67.1±2.20	14–126	66.8±1.21	13–139
Upper Facial Length	42.9±2.22	10–80	42.0±1.2	12–88
Lower Facial length	41.5±2.70	12–137	43.10±1.00	12–122
Total Facial length (mm)	84.5±3.20	32–187	86.10±2.0**	15–139
Nose Width (mm)	11.31±0.35*	4.0–24	9.30±0.14	4.0–22
Skull Height (mm)	156.8±5.40*	86–268	150.10±2.4	75–235

*$p \leq 0.05$ shows statistically significant differences among Igede Females in Benue State, Nigeria; **$p \leq 0.01$ shows high significant values among Idomale Females in Benue State, Nigeria.

Table 6: Cephalometric indices from anthropometric variables among Igede and Idoma ethnic group of Benue State, Nigeria

VARIABLES (%)	IGEDE	IDOMA
Cephalic Index (CI)	76.54	77.33
Upper Facial Index (UFI)	63.27	68.76
Nasal Facial Index (NFI)	23.79	24.61
Cephalic Module (CM)	96.06	93.97
Length ─Height Index (L- HI)	90.42	77.60
Bredth─ Height Index (B- HI)	110.87	117.00
Mean - Height Index (MHI)	116.85	111.76

Table 7: Pearson correlation of anthropometric variables

	Age	HL	HW	BZD	UFL	LFL	TFL	NW	SH
Age		0.19	0.10*	-0.17	-0.19***	-0.09	-0.20	-0.13**	-0.02
HL			0.28***	0.10*	0.04	-0.06	0.04	-0.06	-0.01
HW				0.23***	-0.20***	0.08	-0.18***	-0.26***	0.03
HL					0.13**	0.30***	0.21***	-0.03	0.13
BZD						0.36***	0.75***	-0.09	0.08
UFL							0.53***	-0.08	-0.03

TFL	-0.07	0.03
NW		0.08
SH		

Head length(hl), Head width(hw), Bizygomatic distance(bzd), Nose width(nw), Upper facial length(ufl), Lower facial length(lfl), Total facial length(tfl) and Skull height(sh)

Table 8: Linear regression of cephalic index from anthropometric parameters among students of Igede and Idoma ethnic groups of Benue State, Nigeria

Population parameters	Prediction equation for cephalic index	SEE	R	R^2	P
IGEDE (N=158)					
CI &HL	0 .877 HL+80.02	0.004	0.131	0.017	0.046
CI & HW	2.087HW+260.6	0.009	0.366	0.134	0 .000
CI & BZD	0.161BZD+131.3	0.003	0.963	0.927	0.041
CI & UFL	0.252 UFL +131.3	0.004	0.165	0.027	0.013
CI & TFL	0.391TFL +189.3	0.005	0.285	0.081	0.000
CI & NW	0.355NW +101.9	0.042	0.285	0.081	0.000
IDOMA (N=267)					
CI &HL	0 .867 HL+80.01	0.003	0.130	0.016	0.047
CI & HW	2.097HW+270.5	0.009	0.355	0.144	0.000
CI & BZD	0.261BZD+131.4	0.002	0.965	0.925	0.042
CI & UFL	0.352 UFL +132.3	0.004	0.160	0.025	0.014
CI & TFL	0.390TFL +180.3	0.004	0.385	0.071	0.000
CI & NW	0.345NW +100.7	0.041	0.385	0.082	0.000

Cephalic Index (CI), Head Length (HL), Head Width (HW), Bizygomatic Distance (BZD), Upper Facial Length (UFL), Total Facial Length (TFL) and Nose Width.

Head length(HL), Head width(HW), Bizygomatic distance(BZD), Upper facial length(UFL), Lower facial length(LFL), Nose width(NW) and Skull height(SH).

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RECOMMENDATION

It is hence recommended that further studies be carried out using larger population and mitochondria DNA analysis using autosomal and polymorphic markers through blood samples to validate the level of cephalic indices as indicator to establish anthropometric relationships amongst Igede and Idoma ethnic tribes of Benue States. Also, the used of aged 17-40 years and other cephalometric indices in the present study be extended using other forms like palmar and foot indices, increase of age and selection of individual tribes for wider anthropometric coverage in Nigeria and Africa.

REFERENCES

1. Zahra, H.,Hamid-Reza, M.S. and Mohammad-Hosein, N M. Morphological evaluation of head and face in 18-25 years old woman in south-east of Iran. J Med Sci 2006; 6:400-404.
2. Barrette R.L., and Mathog R.H. Orbit Measurement in black and White population. Larynsgoscope 2009;109:105.
3. Montagu A. A. Handbook of Anthropometry. Springfield, Illinois, U.S.A. Charles C. Thomas Pub Ltd, 2006.
4. Danborno B and Asala S.A. Craniometric study and derived indices in Nigerian. Proc West African J Anat 1997;5:20.
5. Abbie A.A. Closure of cranial articulation in the skull of Australian Aborigine. Anat 2009;86:1-12.
6. Panero J. Human dimension and inferior space. First edition. Architectural Press Ltd, London, p 15, 1979.
7. Radoc Z, Muretic Z, Nemirovskij V, and Coklica V. Craniofacial variations in a South Dalmatian population. Acta Stomatol Croat 2000;34:399-403.
8. Oladipo GS, Olutu EJ, Osah T, Osunwoke EA, Hart J and Ordu K. A comparative study of cephalic indices of Nigerian Ibibios and Efiks. J Arts Cult 2009;4:62-65.
9. Reichs KJ, Bass WM. Forensic Osteology: Advances in the identification of human remains (2nd edition), Springfield, Illinois, U.S.A. Charles C. Thomas Publisher Ltd, 1998.
10. Rajlakshmi CH, Shyamo S M, Bidhumkhi TH and Chandramani SL. Cephalic index of foetuses of Manipuri population– A Baseline study'. J Anat Soc India 2001;50:13-16.
11. Safikhani Z, Afzali N, and Bordbar H. Determination of anatomical type of head and face in children under 6 years in Ahwaz. Iran-Acta Media Iranica 2007;45:43-45.
12. Ganong WF. Advances in the identification. of human remains (2nd Edition). Springfield, Illinois, U.S.A. Charles C, 2005, pp. 392-397.
13. Bharati S, Som S, Bharati P, and Vasulu TS. Climate and head form in India. Am J Hum Biol 2001;13:626-634.
14. Nainge AG and Devershi DB. Comparison of cranial sex determination by univariate and multivariat analysis. J Anat Soc India 2006;55:2
15. Eroje MA, Fawehinmi HB, Jaja BN and Yaakor L. Cephalic index of Ogbia tribe of Bayelsa State. Int J Morphol 2010;28:389-392.
16. Golalipour MJ and Haidari K. Effect of ethnic factor on cranial capacity and brain weight of male child in Northern Iran. Neuroembryology and Aging 2006;5:146-148.
17. Tuli A, Choudhry R, Aggarwal S, Anand E and Gary H. Correlation between craniofacial dimensions and foetal age. J Anat Soc India 1995;44:1-12.
18. Okupe RF, Cooker OO, and Gbajumo SA. Assessment of fetal biparietal diameter during normal pregnancy by ultrasound in Nigerian women. Br J Obstet Gynaecol 1984; 99:629-632.
19. Bayat PB. A comparison of the cranial capacity and brain weight of Arak with other subgroups of Iranian population. Int J Morphol 2010;28:323-326.
20. Maina MB, Mahdi O, and Kalayi GG. Craniofacial forms among three dominant ethnic groups of Gombe state, Nigeria. Int J Morphol 2012;2:10.
21. Raji JM, Garba SH, Numan AI, Waziri MA, and Maina MB. (2010). Morphological evaluation of head and face shapes in a North-Eastern Nigeria population. Aust J Basic and Appl Sci 2010;4:3338-3341.
22. Oluwole OS. and Osah T. Morphological evaluation of head and face shapes in a South-Western Nigeria population. J Basic Med Sci 2009;4:41.
23. Kosa F. Application and role of anthropological research in the practice of forensic medicine. Acta Biol Szeged 2000;44:179-188.

24. Umar MBT, Ojo AS, Asala SA, and Hambolu JO. Comparison of cephalometric indices between the Hausa and Yoruba ethnic groups of Nigeria. Res J Med Sci 2011;5:83-89.
25. Jacks DR, Taylor K. Estimation of stature from the length of the cervical, thoracic and lumbar segments of the spine in American Whites and Blacks. J Forensic Sci 1997;40:59-62.
26. Taura MG. Cephalometry of Hausa tribe of Kano State of Nigeria-a preliminary study. A PhD thesis proposal, Ahmadu Bello Universsity Zaria, 2004.
27. Williams BM. Characterization of stature and body compositions from the length of the head and width of American Whites and Blacks. J Forensic Sci 1995;20:69-82.
28. Williams BM, and Macks DR. Estimation of stature from the length of the head and width of American Whites and Blacks. J Forensic Sci 1996;36:70-202.

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