

STUDY OF SOME ANTHROPOMETRIC PARAMETERS OF ITSEKIRI AND OKPE ETHNIC GROUPS OF DELTA STATE, SOUTH-SOUTH NIGERIA

¹OLADIPO, G.S., ¹COKER, T., ²ANUGWEJE, K.C., ³ABIDOYE, A.O.

Department of ¹Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, University of Port-Harcourt, River State, Nigeria ²University Health Centre, University of Port-Harcourt, River State, Nigeria.

³Physiology, Lagos State University, College of Medicine, Ikeja, Lagos, Nigeria.

Corresponding author: oladipogabriel@yahoo.com

ABSTRACT

This determines and compares the human physical variations in some selected anthropometric parameters among the Itsekiri and Okpe ethnic communities Delta, Nigeria. 1000 apparently healthy adult subjects comprising 250 males and 250 females from each of the communities, were randomly selected for this study. Using standard laboratory procedures, height, knee height, waist circumference, hip circumference, arm length, head length, head breadth, nasal length, and nasal breadth were measured while nasal index, waist/hip ratio and cephalic index were calculated using standard formulae. Results showed that the two ethnic groups presented typical nose (platyrrhine) and head (dolicocephaly) types for African populations. Except for nasal index (90.78 vs 92.05), the Itsekiris' presented higher mean head length (18.45cm vs 18.29cm), head breadth (13.46cm vs 13.06cm), cephalic index (73.04 vs 71.84), nasal height (4.59cm vs 4.38cm), nasal breadth (4.14cm vs 4.06cm), waist circumference (80.75cm vs 77.09cm), hip circumference (94.64cm vs 92.05cm), waist-hip ratio (0.85 vs 0.83), height (169.06cm vs 165.28cm), knee height (49.82cm vs 47.05cm) and arm length (38.93cm vs 36.63cm) than Okpes. Overall, sexual dimorphism was observed in the ethnic groups, with males showing higher values than females ($p < 0.05$). This data is recommended to anthropologists, forensic experts' geneticists and medical practitioners who may find it very useful.

Keywords: Anthropometry, Nigeria, Parameters, Ethnic group

Received: 23rd September, 2013

Accepted: 29th October, 2013

Published: 31st October, 2013

INTRODUCTION

Variations in body proportions and dimensions have been established within and between races (Williams *et al.*, 1995; Oladipo *et al.*, 2006); amongst individuals of different sex and age (Basu, 1963); and between people living under different conditions (Risely, 1915). Most of these measurable variations have been largely attributed to skeletal variations.

Physical anthropology relies mainly on external measurements and descriptions of the human body, and in particular, upon the skeleton. Such measurements are useful in the analysis and classification of fossil remains, as well as the study of living population (Alex *et al.*, 1996). Specifically, the ratios between one related human measurement and another, is collectively referred to as an 'Anthropometric Index' amongst which are the nasal and cephalic indices (Williams *et al.*, 1995).

Nasal index is a ratio of the greatest width of the nasal aperture to the height of the nasal skeleton multiplied by 100 (Williams *et al.*, 1995). The nasal index measurement is the most common nasal

measurements which may be related to regional and climatic differences (Risely, 1915). It also exhibit sexual difference (Oladipo *et al.*, 2006). Based on the index, the nose has been classified into leptorrhine or fine nosed (≤ 69.9), mesorrhine or medium nosed (70.0-84.9) and platyrrhine or broad nosed (≥ 85.0) (Risely, 1915).

The 'Cephalic index' is the ratio of the head breadth to the head length, and it is used to determine racial (Shah and Jadhav, 2004) and sexual (Williams *et al.*, 1995) differences amongst populations. Three classifications of cephalic index that can be used to describe human head have been identified. These include dolicocephaly, mesocephaly and brachycephaly (Golalipour *et al.*, 2005).

Another useful anthropological parameter is the waist/hip ratio, which signifies the ratio of the waist circumference to the hip circumference, and a waist/hip ratio less than one indicates a much lesser risk to health problems associated with abdominal adiposity (Marwick, 1991). Other measurable human variations which can be attributed to social,

economic, and cultural conditions, and as seen in the current bio-cultural view of the causes of variation in human body size and shape (Basu, 1963), include body height, knee height and arm length.

With focus on these physical human variations, this study therefore, intends to determine the variations in Height, Knee height, Waist circumference, Hip circumference, Arm length, Head length, Head breadth, Nasal length, and Nasal breadth amongst the Itsekiri and Okpe ethnic populations of Delta State, Nigeria, with specific reference to their cephalic and nasal indices, as well as their waist-hip ratio.

MATERIALS AND METHODS

Study population: A total of 1000 subjects comprising 500 Itsekiris (250 males and 250 females) and 500 Okpes (250 males and 250 females), between the ages of 18-70 years were studied. These two ethnic groups inhabit Delta state, in the extreme Southern part of Nigeria. They both live in the western-most part of the Niger Delta.

Target population: Participants were randomly selected from various communities in Delta State: Ubeji, Irigbo, Omadino, Ugborodo, Ekrade-itsekiri, Amukpe, Eku, Jeddo and Adeje community in Nigeria. The subjects were grouped based on their gender and age.

Exclusion criteria: Individuals with any cranio-facial abnormalities, growth-related disorders, genetic abnormalities, physically disabled persons, facial trauma, and those belonging to intermingling communities (i.e. children whose parents and grandparents had inter-tribal marriages) were excluded from the study.

Data collection: Materials used for this study included; spreading caliper, sliding (venier) caliper, flexible, but non-stretchable measuring tape, portable/wall mounted stadiometer. The height was measured with the help of stadiometer from the top cranium down to the base of the feet. The Knee height was measured with the help of the non stretchable measuring tape from the patella to the feet.

The waist circumference (midway between the lower rib margin and iliac crest) and the hip circumference (maximum circumference over the buttocks) and also arm length (head of humerus to the elbow joint) were all measured with the non-stretchable measuring tape. The head length (greatest anteroposterior diameter) was measured with the help of the spreading caliper

as the distance from the glabella toinion. The head breadth was measured also with the used of the spreading caliper as the maximum transverse diameter between the left and right temporal bone. The nasal height was measured as the distance from nasion to nasospinale (Oladipo *et al.*, 2006). The nasal breadth (maximum breadth of the nose) was measured at right angles to the nasal height from ala to ala.

Data analysis: All measurements were taken in centimeters and to the nearest two decimal places. Statistical analysis was done using SPSS version 17.0 for T-test and Z-test at confidence interval of 95%.

RESULTS

The Itsekiri males and females had a mean head length of 18.83cm and 18.02cm, mean head breadth of 13.60cm and 13.32cm, cephalic index of 71.96 and 74.11, mean nasal height of 4.67cm and 4.50cm, mean nasal breadth of 4.22cm and 4.07cm, mean nasal index of 91.01 and 90.55, mean waist circumference of 81.12cm and 80.37cm, mean hip circumference of 92.70cm and 96.58cm, waist-hip ratio of 0.86 and 0.83, mean height of 173.01cm and 165.12cm, mean knee height of 50.46cm and 49.17cm, and mean arm length of 39.46cm and 38.40cm. Sexual dimorphism was observed ($P < 0.05$) with males showing significantly higher values than the females for all parameters studied except cephalic index and hip circumference where the females shows significantly higher values than the males (Table 1).

The Okpe males and females had a mean head length of 18.74cm and 17.83cm, mean head breadth of 13.14cm and 12.98cm, cephalic index of 70.74 and 72.95, mean nasal height of 4.46cm and 4.30cm, mean nasal breadth of 4.15cm and 3.98cm, mean nasal index of 93.67 and 92.58, mean waist circumference of 74.31cm and 79.86cm, mean hip circumference of 88.18cm and 95.91cm, waist/hip ratio of 0.83 and 0.82, mean height of 168.49cm and 162.07cm, mean knee height of 48.69cm and 45.42cm, and mean arm length of 36.86cm and 36.39cm. Sexual dimorphism was observed ($P < 0.05$) with males showing significantly higher values than the females for all parameters studied except cephalic index, waist circumference and hip circumference where the females shows significantly higher values than the males (Table 1).

The Itsekiris on the average had a mean head length of 18.45cm, mean head breadth of 13.46, cephalic

index of 73.04, mean nasal height of 4.59cm, mean nasal breadth of 4.14cm, mean nasal index of 90.78, mean waist circumference of 80.75, mean hip circumference of 94.64cm, waist/hip ratio of 0.85, mean height of 169.06cm, mean knee height of 49.82cm and mean arm length of 38.93.

mean cephalic index of 71.84, mean nasal height of 4.38, mean nasal breadth of 13.06cm, mean nasal index of 92.05, mean waist circumference of 77.09, mean hip circumference of 92.05, mean waist/hip ratio of 0.83, mean height of 165.28cm, mean knee height of 47.05, and a mean arm length of 36.62cm. Overall, the parameters in focus were significantly different between the two groups (P<0.05).

Similarly, the Okpes on the average had a mean head length of 18.29cm, mean head breadth of 13.06cm,

Table 1: Gender differences in some anthropometric parameters among Itsekiri and Okpe ethnic communities

Parameters	Males		Females	
	Itsekiri (n=250)	Okpe (n=250)	Itsekiri (n=250)	Okpe (n=250)
Height (cm)	173.01±8.77	168.49±3.95 ^a	165.12±7.12*	162.07±5.24* ^b
Waist circumference (cm)	81.12±10.30	74.31±8.37 ^a	80.37±11.82*	79.86±10.83*
Hip circumference (cm)	92.70±7.42	88.18±6.95 ^a	96.58±11.09*	95.91±11.32*
W/ H ratio	0.86±0.07	0.83±0.07 ^a	0.83±0.07*	0.82±0.06*
Head length (cm)	18.83±1.12	18.74±0.87	18.02±0.92*	17.83±0.76* ^b
Head breath (cm)	13.60±0.68	13.14±0.81 ^a	13.32±0.57*	12.98±0.55* ^b
Cephalic index	71.96±4.66	70.74±5.30 ^a	74.11±4.70*	72.95±3.64* ^b
Nasal height (cm)	4.67±0.44	4.46±0.37 ^a	4.50±0.35*	4.30±0.38* ^b
Nasal breath (cm)	4.22±0.40	4.15±0.36 ^a	4.07±0.30*	3.98±0.33* ^b
Nasal index	91.01±5.98	93.67±7.97 ^a	90.55±4.73*	92.58±9.87* ^b
Arm length (cm)	39.46±2.25	36.86±2.75 ^a	38.40±2.49*	36.39±2.76* ^b
Knee height (cm)	50.46±2.87	48.69±4.20 ^a	49.17±4.39*	45.42±3.42* ^b

Values are Mean± SD; where SD = standard deviation; n: sample size; * = Statistical significant at P<0.05 compared to corresponding ethnic group male parameters. ^a = Significant different at p<0.05 between male of the two ethnic groups; ^b = Significant different at p<0.05 between female of the two ethnic groups.

Table 2: Differences in some anthropometric parameters among Itsekiri and Okpe ethnic communities

Parameters	Itsekiri ethnic group (n=500)	Okpe ethnic group (n=500)
Height (cm)	169.06±8.90	165.28±5.64*
Waist circumference (cm)	80.75±11.09	77.09±10.06*
Hip circumference (cm)	94.64±9.62	92.05±10.06*
Waist-hip ratio	0.85±0.79	0.83±0.07*
Head length (cm)	18.45±1.04	18.29±0.93*
Head breath (cm)	13.46±0.64	13.06±0.70*
Cephalic index	73.04±4.80	71.84±4.67*
Nasal height (cm)	4.59±0.41	4.38±0.38*
Nasal breath (cm)	4.14±0.36	4.06±0.36*
Nasal index	90.78±5.39	93.12±8.98*
Arm length (cm)	38.93±2.43	36.62±2.76*
Knee height (cm)	49.82±3.76	47.05±4.16*

Values are Mean± SD; where SD = standard deviation; n= sample size; * = Statistical significant at P<0.05

DISCUSSION

Racial differences have been reported by several authors (Franciscus and Long, 1991; Risley, 1915; Romo and Abraham, 2003; Oladipo *et al.*, 2009; William *et al.*, 1995; Jansen, 1984). Oladipo *et al.*

(2006) reported that the mean nasal indices of Nigerian Igbos were 95.9 and 90.8 for males and females respectively. Thus, Igbos has the platyrrhine nose type and also shows sexual dimorphism. All the authors above agreed with racial differences in nasal index, and our results conformed to their reports; especially with that of Risley (1915).

It was also evident that there were significant differences ($p < 0.05$) between the Itsekiri males and Okpe males and between Itsekiri females and Okpe females for all studied parameters except for head length (between Itsekiri males and Okpe males) and waist and hip circumferences and waist/hip ratio (between Itsekiri females and Okpe females) where significant differences ($p > 0.05$) were not recorded. More so, sexual dimorphism was obvious in both the Itsekiri and Okpe ethnic group ($p < 0.05$) with males showing significantly higher values than females.

By implication, the present study has confirmed that the Itsekiris and Okpes of Nigeria have the Dolicocephaly head type with cephalic index of 73.04 and 71.84 for Itsekiris and Okpes, and the Platyrrhine type of nose with nasal index of 90.78 and 93.12 for Itsekiris and Okpes respectively. Both the Itsekiris and Okpes are not at much risk to health problems associated with abdominal adiposity as both having a Waist to Hip ratio less than 1.0 (Marwick, 1991). Sexual dimorphism occurred in most parameters measured with the males showing significantly higher values than the females. Genetics and environmental factors could be responsible for the variation in body dimension between and within populations (Cem *et al.*, 2001; Kasai *et al.*, 1993).

Though a number of records exist, only a limited reference material for these parameters exists for African ethnic groups. Hopefully, this present study will provide reference data for the Itsekiri and Okpe ethnic groups of Nigeria, which could be of relevance in clinical practice, forensics, anthropological studies, treatment planning and other commercial applications. Thus this data is recommended to anthropologists, forensic experts, geneticists and medical practitioners who may find it very useful and will also serve as a future framework for estimating the body dimensions of other Nigerians ethnic groups.

ACKNOWLEDGEMENT

We acknowledge the willingness of all the respondents used in this study.

REFERENCES

Alex, F.R., Steven, B. and Timothy, G.L. (1996). Human body composition. 4th Edition. Human Kinetics Publishers. Pp. 167-172.

Basu, A. (1963). Anthropometry of the Kayasthas of Bengal. *J. Anat. Soc. India.*; 3: 20-25.

Oladipo *et al.*, IJCR 2013; 2(4): 77-80.

Cem, E., Cengiz, Y., Hamdi, E., Selim, D. and Yasar, D. (2001). Normative values of craniofacial measurements in idiopathic benign micro-cephalic children. The cleft palate. *Cranio. J.*; 38(3): 260-263

Franciscus, R.G. and Long, J.C. (1991). Variation in human nasal height and breadth. *Am. J. Phys. Anthropol.*; 85: 419-42.

Golalipour, M.J., Jahanshali, M. and Haidari, K. (2005). The variation of head and face shapes in females newborns in the south- East of the Caspian sea (Iran-Gorgan). *Eur. J. Ant.*; 9(2): 95-98.

Jansen, A.A.J. (1984). Weight-height, weight-for-height and quetelets index of Akamba School and adults. *E. Afr. Med. J.*; 61: 273-282.

Kasai, K., Richards, C.L. and Brown, T. (1993). Comparative study of craniofacial morphology in Japanese and Australian aboriginal populations. *Hum. Biol.*; 65: 821 -834.

Marwick, C. (1991). Desirable weight² goes up in New Guidelines. *J. Amer. Med. Ass.*; 265: 17

Oladipo, G.S., Gwunireama, I.U. and, Asawo, O. (2006). Anthropometric comparison of nasal indices between the Igbos and Yoruba in Nigeria. *Glob. J. Med. Sci.*; 5(1): 37-40.

Oladipo, G.S., Udoaka, I.A., Afolabi, O.E. and Bob-Manuel, F.I. (2009). Nasal parameters of Itsekiris and Urhobos of Nigeria. *Internet J. Biolog. Anthropol.* 3: (1).

Risley, H.H. (1915). The people of India. 2nd Edition. Edited by Crooke W. Pp. 395-399.

Romo, T. and Abraham, M.T. (2003). The ethnic nose. *Facial Plastic Surg.*; 19(3): 269-278.

Shah, G.V. and Jadhav, H.R. (2004). The study of cephalic index in student of Gujarat. *B. J. Med. Coll.*; 153: 25-26.

Williams, P.L., Warwick, R., Dyson, M. and Bannister, L.H. (1995). Grays Anatomy. 37th Edition, Churchill Livingstone London. Pp. 609-612

AUTHOR'S CONTRIBUTION

Dr Oladipo, G.S. conceived and designed the research work that formed this article. Coker, T. did the measurements of variables while Dr Anugweje, K.C. and Dr Abidoye A.O. provided other logistics.