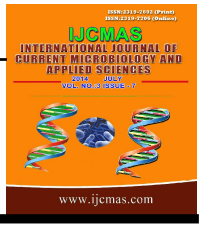
International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 3 Number 7 (2014) pp. 926-937**
http://www.ijcmas.com



Original Research Article

A study on some oro-facial variables of adults of bonny ethnic group in Nigeria

Oladipo Gabriels*, U.Dike Eberechi, S.Hart Josiah, A.Amadi Michael and N.Jumbo Favour

Department of Human Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, University of Port Harcourt-Nigeria
Corresponding author

Keywords

Anthropology, face, Ethnicity; oro-facial and Bonny Island

A B S T R A C T

This study was carried out to determine the mean values of facial, nasal, maxillary, mandibular and oro-facial heights for the people of Bonny ethnic group in Rivers State of Nigeria. One thousand (1000) adult subjects purely of Bonny ethnic origin were randomly selected for the study; this comprised five hundred (500) male and five hundred (500) female subjects. Those selected for the study were purely of Bonnyorigin, that is, those whose parents and grandparents were Bonnies. Subjects' ages were between 18 and 76years. The above oro-facial variables were measured with the aid of a digital vernier caliper at various standard landmarks. The results obtained were analyzed using discrete statistics for mean and standard deviation. Test of significance was done with 'z' test. Results obtained indicated that male subjects had a mean facial height of 11.98 ± 3.44cm, nasal height of 4.58 ± 0.21cm, maxillary height of 2.51 ± 0.14cm, mandibular height of 4.50 ± 0.17cm andoro-facial height of 7.02 ± 0.19cm while female subjects had a mean facial height of 11.36 ± 0.47cm, nasal height of 4.42 ±0.12cm, maxillary height of 2.39 ± 0.13cm, mandibular height of 4.36 ± 1.48cm and oro-facial height of 6.74 ± 0.17cm. Male subjects had significantly higher mean values than female subjects in all variables. Thus the above oro-facial variables are sexually dimorphic among the Bonny ethnic group. The results of this study also showed that Bonny ethnic group has its characteristic orofacial features as its values differ from other Nigerian ethnic groups and world populations previously investigated. The results of this study is recommended for anthropological, forensic and clinical investigations of the Bonny ethnic group. The plastic or cosmetic surgeon working on Nigerians especially people from Bonny Island should feel free to use this data as it is reliable.

Introduction

The Kingdom of Bonny or Bonny Island is an ethnic group in Rivers State, Niger Delta, Nigeria.

The Niger Delta is the delta of the Niger River in Nigeria. It is a densely populated region sometimes called the Oil Rivers

because it was once a major producer of palm oil. The area was the British Oil Rivers protectorate from 1885 until 1893, when it was expanded and became the Niger coast protectorate. The Niger Delta, as now defined officially by the Nigeria government, extends over about 70,000km^2 and makes up 7.5% of Nigeria's land mass. Historically and cartographically, it consists of present day Bayelsa, Delta, and Rivers States. In 2000, however Obansajo's regime included Abia, Akwa-Ibom, Cross River, Edo, Imo and Ondo states in the region. Some 31 million people of more than 40 ethnic groups are among the inhabitants in the Niger Delta, speaking about 250 different dialects (Wikipedia, 2010).

Rivers State,one of the 36 states of Nigeriais a coastal State situated in Southern Nigeria. It is in the Niger Delta region and is one of the main oil producing states in Nigeria. Its capital is Port Harcourt. It is bounded on the South by the Atlantic Ocean, on the North by Imo, Abia and Anambra States, the East by AkwaIbom State and on the West by Bayelsa and Delta states. Rivers state is home to diverse ethnic groups. The major ethnic groups and dialects include the Ikwerre, Ijawand Ogoni. Bonny as a people speak the Ijaw dialect. The inland part of Rivers state consists of tropical rainforest; towards the coast the typical Niger Delta environment features many mangrove swamps (Alagoa, 2000).
Anthropometry or anthropometric study is the science that deals with the act of measurement of humans. In physical anthropology, it refers to the measurement of the human individuals for the purposes of understanding human physical variation (Ugochukwu, 2010).

In the past, anthropometric data were used to measure gender discrimination (Moestue, 2008). Anthropometry plays a pertinent role in industrial design, clothing design, ergonomics and architecture where statistical data about the distribution of body dimensions in the population are used to optimize products. Changes in life-styles, nutrition and ethnic composition of the population led to changes in the distribution of body dimensions (e.g. the obesity epidemic) and require regular updating of anthropometric data collections. Craniofacial anthropometry is a technique used in physical anthropology comprising precise and systematic measurement of the bones and of the human skull. Among its more important applications are forensics, facial construction and Paleoanthropology (Bartlett *et al.*, 1992).

Some authors have suggested that the appreciation of beauty by the human mind leads to an attraction to proportion in harmony with the golden section which is 1.618 and its reciprocal 0.618 (Huntley 1970; Rabanus 2003).

Rabanus (2003) defined golden proportion as the shorter part is to the longer part as the longer part is to the whole and each ratio equals 0.618.

Oladipo*et al*., (2007) reported nasal parameter ofOgonis in Nigeria. They reported nasal heights of Ogoni males and females as 3.99cm and 3.91cm respectively. Akpa et al. (2003) reported nasal height of Igbos as 6.31cm and 6.04 for males and females respectively. Didia (2005) determined the normal mean values of facial, nasal, maxillary, mandibular and oro-facial heights in adult Nigerians. A total of 200 subjects consisting of 110 males and 90 females randomly selected from the student population of the

University of Port Harcourt, Nigeria and whose ages ranged from 18-42 years were recruited into the study. Each parameter was measured several times with a vernier sliding caliper until three consistent values were obtained. The results obtained indicate a sexual dimorphism, with a significantly higher value of all parameters in males compared to females ($p<0.05$).

Osunwoke*et al*., (2011) carried out a study on sexual dimorphism in facial parameters of adult Binis. They measured structures relating to the face and how it differs between the two sexes in adult Binis of South-Southern Nigeria. A total of one thousand (1000) subjects comprising 500 males and 500 females (18-45 years) were randomly selected from Benin City in Edo state. Measurements were taken using a digital vernier caliper. The mean Menton-Nasion distance in males was 113.62±9.44mm, and 109.05±6.58mm in females. Zygoma-Zygoma 124.63±5.78mm in males and 122.28±6.39mm in females, Subnasal-Subnasal 43.05±3.83 in males and 39.93±3.96mm in females, Ala-Ala 41.14±3.30mm in males and 37.34±3.50mm in females, Lip width 26.67±4.11 in males and 25.59±3.03mm in females, Menton-Subnasal 65.97±5.91mm in males and 60.35±5.71mm in females. Bini males had significantly higher values than Bini females in all the facial parameters measured ($p<0.05$). The most prominent significant difference was observed in Ala-Ala (nose breadth) 90.8% and the least was observed in Zygoma-Zygoma (face breadth) 98.1%.

Oladipo*et al*., (2010) carried out a study to determine the mean values of facial, nasal, maxillary, mandibular and oro-facial heights of adult Ibibios. Eight hundred (800) subjects purely of Ibibio ethnic group comprising 400 males and 400 females, aged between 18 and 80 years were used for the study. The facial height, nasal height, maxillary height, mandibular height and oro-facial height were measured using sliding vernier caliper and the results obtained showed that the males had mean facial height of 11.14±0.77cm, nasal height of 4.15±0.34cm, maxillary height of 2.53±0.38cm, mandibular height of 4.46±0.43cm and oro-facial height of 6.99±0.59cm while the females had mean facial height of 10.55±0.74cm, nasal height of 3.93±0.35cm, maxillary height of 2.48±0.49cm, mandibular height of 4.14±0.33cm, and oro-facial height 6.63±0.60cm. Statistical analysis using the z-test showed that the males had significantly higher values than the females in all the facial parameters measured ($p<0.05$), hence parameters were sexually dimorphic.

Oladipo*et al*., (2008) carried out a study on sexual dimorphism in facial dimensions of adult Ijaws comprising five hundred (500) males and five hundred (500) females aged 18 years and above. The results obtained showed that Ijaw males had a mean facial height 11.8±0.5cm, nasal height 4.71±0.65cm, maxillary height 2.49±0.33cm, mandibular height 4.60±0.61cm and oro-facial height 7.12±0.9cm while mean facial dimensions for female Ijaws were facial height 10.71±1.03cm, nasal height 4.43±0.59cm, maxillary height 2.39±0.32cm, mandibular height 4.28±0.57cm and oro-facial height 6.50±0.87cm.

Didia and Dappa (2005) reported facial, nasal, maxillary, mandibular and oro-facial heights of adult Nigerians. They obtained figures for the male subjects as facial height 12.28±3.39cm, nasal height 4.50±1.23cm, maxillary height

2.44±0.66cm, mandibular height 4.49±1.28cm and oro-facial height 6.90±1.89cm while figures obtained for the female subjects were facial height 11.77±3.5cm, nasal height 4.48±1.3cm, maxillary height 2.30±0.69cm, mandibular height 4.20±1.26cm and oro-facial height 6.32±1.91cm.

Olotu *et al*., (2009) carried out a study on facial and nasal length of adult Igbos comprising 300 male and 300 female subjects. The result obtained showed that the average facial height for males was 12.55±2.11cm and nasal height 4.87±0.84cm while facial height for females was 11.9±1.92cm and nasal height 4.40cm±0.76cm.The results obtained indicated sexual dimorphism with higher values of all parameters in males compared to females.

Ugochukwu (2010) reported facial, nasal, maxillary mandibular and oro-facial height of adult Ogbias and Nembes. The study was carried out using one thousand (1000) subjects purely of Ogbia and Nembe origin. These comprised five hundred (500) Nembes and five hundred Ogbias. Two hundred fifty (250) were males and two hundred and fifty (250) were females in each group. The facial height, nasal height, maxillary height, mandibular height and oro-facial height were measured and the results obtained showed that the Nembe males had mean facial height of 12.33±0.2cm, nasal height 4.49±0.19cm, maxillary height 2.42±0.12cm, mandibular height 4.44±0.13cm and oro-facial height 6.83±0.25cm and the Nembe females had a mean facial height of 11.88±0.26cm, nasal height 44.62±0.15cm, maxillary height 2.44±0.14cm, mandibular height 4.49±0.22cm and oro-facial height 7.11±0.18cm. While the Ogbia males had facial height of 11.87±0.14cm, nasal height 4.79±0.04cm, maxillary height 2.53±0.45, mandibular height 4.59±2.4cm and oro-facial height 7.10±0.55cm and for the Ogbia females the mean facial height was10.68±0.15cm, nasal height 4.43±0.09cm, maxillary height 2.39±0.03cm, mandibular height 4.25±2.29cm and oro-facial 6.64±2.32cm. This study shows that the male values were higher than the females. Therefore, the study shows sexual dimorphism among the Nembes and Ogbias.

The further away a face is from the ideal proportions and facial profile, the more likely that it will have certain medical problems (Jefferson, 1996).

Sclafani (2003) collected digital photographs of first generation Korean-American Women and then anonymously presented it to reviewers who would rate the global aesthetics of each face. The photographs collected would then be analyzed and a set of aesthetic measurements would be made. The overall averages of these measurements were then compared to published standards for Caucasians, as well as the average measurements for the most aesthetic decile of photographed Korean-American Women. After comparison with the Caucasian standard values, he found out that the Korean-American women had a wider and round face. Sclafani then concluded that the study would help guide facial plastic surgeons in caring for Korean-Americans.

Mohindra and Bulman (2002) investigated the effect of increasing vertical dimension of occlusion on facial aesthetics. The study considered ninety-six (96) patients whose facial aesthetic have been impaired by increasing vertical dimension of occlusion

and concluded that the alternative to having the lower facial height inversing should be considered in some cases before embarking on cosmetic surgery. A combination of increase in lower facial height in addition to cosmetic surgery may achieve a more dramatic and pleasing result.

The length of the face is determined by the distance of separation of jaws. Occlusal vertical dimension or contact vertical dimension is the lower face height with the teeth in centric occlusion. Rest vertical dimension is the lower face height measured from a chin point to a point just below the nose, with the mandible in rest position (Jablonski, 1992).

Di-Paolo *et al*., (1985) stated that the average of anterior and posterior lower facial height is equal to the average of the maxillary and mandibular base lengths.
A cephalometric study was conducted using the quadrilateral analysis developed by Di-Paolo to establish a norm for the people of Taiwan. Various craniofacial skeletal patterns were measured in 40 male and 25 female patients diagnosed with open bite and these measurements were compared with values taken from a group of normal Taiwanese. The results supported the following generalization:

a) The sagittal angle, average lower facial height and the maxillary and mandibular sagittal ratio of subjects with anterior open bite (AOB) are larger than those of normal subjects.
b)
c) The growth pattern of subjects with the anterior open bite (AOB) group is hyperdiregent. Abnormalities in the maxilla-mandibular complex cause changes in the vertical dimension of facial patterns. The relative positions and the spatial relations of the nose, lip and chin are achieving a balanced facial profile (Rickets, 1968).
d)
Carkire*et al*., (2001) studied the relationship between oro-facial morphology and obstructive sleep opneal (OSO) in Caucasians and African-Americans and concluded for some persons that head forms may be important factors that increase the susceptibility to obstructive sleep opneal.

Chung *et al*., (2008) reported the use of 3-dimensional (3D) facial averages to test the hypothesis that the facial morphologies of two European white groups (Slovenia and Wales) have no differences. A total of 187 subjects from Slovenia and Wales formed 4 gender-specific subgroups. The mean linear facial difference between Slovenia females (SF) and Welsh females (WF) was 0.64±0.51mm and between Slovenia males (SM) and Welsh males (WM) was 0.36±0.41mm. Slovenia males and females tend to express class III facial morphology when compared to the Welsh gender-specific subgroups. Male faces, in general, have more pronounced nasal, frontal regions and mandibles when compared with females. Information about normal nasal dimension is very essential to Rhinoplasty (Dong *et al*., 2009).

Morgan *et al*., (1993) presented a photoanthropometric analysis of 104 individuals with Noonan syndrome. The study contained 53 males and 51 females with an age range of one to 60 years (mean 13.8 years). The results provide an objective evaluation of facial abnormality in Noonan syndrome. Individuals with Noonan syndrome were demonstrated to have an increased mid face height, a lower nasal bridge and nasal root, a wider mouth and a more prominent upper lip than

normal control individuals. Within the patient group, an apparent alteration of facial structure was noted with increasing age, suggesting that remodeling of the characteristic face in Noonan syndrome may occur into adult life.

Ebite *et al*., (2010) reported data of five facial measurements: facial height, nasal height, maxillary height, mandibular height and oro-facial height among the Urhobo people of Southern Nigeria. The sample size comprised 140 individual, 60 males and 80 females. The result of the study showed that Urhobos are mesoproscopic. Sexual dimorphism was also observed with males having significantly higher indices than females ($p<0.05$).

Norman (2000) found that the lower anterior facial height was correlated to one effective length of the mid face (Maxillary height).

Anthropometric traits for nose and eyes are complex quantitative traits which are influenced by genetic and environmental factors (Hyun-Jin Kim *et al*., 2010).

Leonardo da Vinci (1452-1519) reported extensively on the properties of the human body. He was the first to describe the three vertical divisions of the face, and body proportions were also reflected in his art. Leonardo da Vinci was a great painter, artist, philosopher and scientist in various fields of science, including anatomy. He first became interested in anatomy as an artist but later approached the subject from a scientific point of view. He did not restrict himself to the study of external structure of the human body but was one of the first scholars to dissect human cadaver and was a genuine innovator in the study of the human organism. He carried out dissection with Dura and Angelus. He began with surface measurement, proportion and the study of muscles.

Leonardo da Vinci contributed greatly to the development of the study of human and animal anatomy and he was the founder of plastic anatomy.

The knowledge of facial proportion values are employed in facial aesthetics of the facial height. It may be possible to restore an aesthetic proportion to the overall face by surgical alteration of the patients alveolar height and/or vertical dimensions (Melaven and Rifken, 2002).

Facial attractiveness is based on a combination of facial proportion, symmetry, and harmony and is immersed in cultural values (Reksodiputro*et al*., 2006).

Robert (2002) stated that the facial angle is formed by two lines, one passing backward from the nostril to the centre of the ear and the other from the nostril upward to the forehead.

Sheldon *et al*., 1980 carried out a comprehensive study on cephalometric analysis of normal adults with careful examination of selected subject group. Fifty-six (56) adult Caucasians with class I skeletal and dental relationships and good vertical facial proportions were analyzed morphologically with a computerized craniofacial model. By the incorporation of a large number of soft tissue measurements, facial profile and proportionality were analyzed and compared with methods that are presently used to evaluate facial aesthetic. The data provide relevant measurements that are useful in the diagnosis and treatment of

adults with dent to facial deformities. Horizontal soft tissues chin prominence was nearly equal for males and females relative to sub-nasal soft tissue, nasion and glabella.

The cephalic index indicates a brachycephalic or relatively short wide head with a tendency towards mesocephaly. From the low nasal index, the Malaysian Indian female have a nose that is narrow or leptorrhine.

When anthropometric methods were introduced into clinical practice to quantify changes in the craniofacial framework, features distinguishing various races/ethnic groups were discovered. Normative data of facial measurements are indispensable to precise determination of the degree of deviations from normal. To treat congenital or post-traumatic facial disfigurement in members of a group successfully, surgeons require access to craniofacial database based on accurate anthropometric measurement, (Marko *et al*., 2005).

Shrestha *et al*., (2009) reported that anthropometry is applied to obtain measurement of living subjects for identifying age, stature and various dimensions related to a particular race or an individual. Population based cross sectional study was carried out in Dharan and its neighboring areas with the help of Anatomy and Community Medicine, B.P. Koirala Institute of Health Sciences, Dharan. This study included 444 healthy people aged 25-50 years belonging to pure race of Rai and Limbu Communities. Head length, nasal ergonomics and total stature were measured for each selected individual. Student‘ t’ test was applied to identify significance of the variables. Except nasal breadth of Limbu, the results showed a significant variation ($p<0.001$) in all parameters between males and females of both communities. It was also revealed that Limbu males and females were taller with larger head length, longer nasal length and nasal height. Similarly nasal breadths of Limbu females were broader whereas in males, Rai had broader nose than those of the Limbu. Therefore it was concluded that anthropometric measurement can play significant role in determining the sex and ethnicity of characteristic pure race of national importance.

Hönn and Göz (2007) stated that anthropometric methods are preferable to cephalometric methods in determining the ‘ideal’ face’s dimensions, since anthropometric methods are valid, three-dimensional, non-invasive, suitable for a great variety of purpose, and easy to implement. Symmetry and averageness play important roles in determining the attractiveness of a face, although distinguishing features make it extraordinarily beautiful.

The present work was aimed at establishing an anthropometric database of some oro-facial parameters of the people of Bonny Island which hitherto is absent.

Materials and Methods

One thousand (1000) subjects of Bonny ethnic group whose ages were between 18 and 76 years were used in the study. The one thousand subjects were made up of 500 males and 500 females.A random sampling method was used in the selection of the subjects. The subjects that were selected had parents and grand-parents who were purely of the Bonny ethnic group. The subjects were selected from the Bonny Island of Rivers State. All the subjects gave their consent.

Only subjects without trauma to the face

were included in the study.All participants had no abnormality of the face and subjects who had trauma of the nose and congenital abnormalities such as cleft lips were excluded in the study. The above age range was chosen because at this range, there are little or no significant changes on oro-facial parameters. In the present study, measurements oforo-facial parameters: facial, nasal, maxillary, mandibular and oro-facial heights were taken with the aid of a digital sliding vernier caliper at specific landmarks as defined by Erika *et al*., 2005(Figure 1).

Facial height was measured as the distance between the nasion of the nose and the menton of the mandible (A+B+C).Nasal height was measured as the distance between the nasion and the anterior nasal spine (A).Maxillary height was measured as the distance between the anterior nasal spine and the junction between the upper and lower lips (B).Mandibular height was measured as the distance between the junction of the upper and lower lips and the menton (C). Oro-facial height was obtained as the sum of the maxillary and mandibular heights (B+C). It is also measured as the distance between the nasospinale and the menton.All measurements were made by one person to ensure uniformity of measurement. Measurements were taken with the subjects sitting uprightly, relaxed, breathing quietly andthe head unsupported. The data obtained were analyzed using discrete statistics and students' z test at significance level of 0.05.

Results and Discussion

The results of the study are presented in table1 to 3.The dimensions of the oro-facial parameters obtained in this study for both male and female subjects are shown in table 1. Table 2 shows the result of z test analysis of the facial dimensionsof male and female subjects while table 3 contains data on facial dimensions observed in the present study and other world populations previously studied. The values obtained for the males were found to be significantly higher than the corresponding female values in all parameters studied ($p < 0.05$).

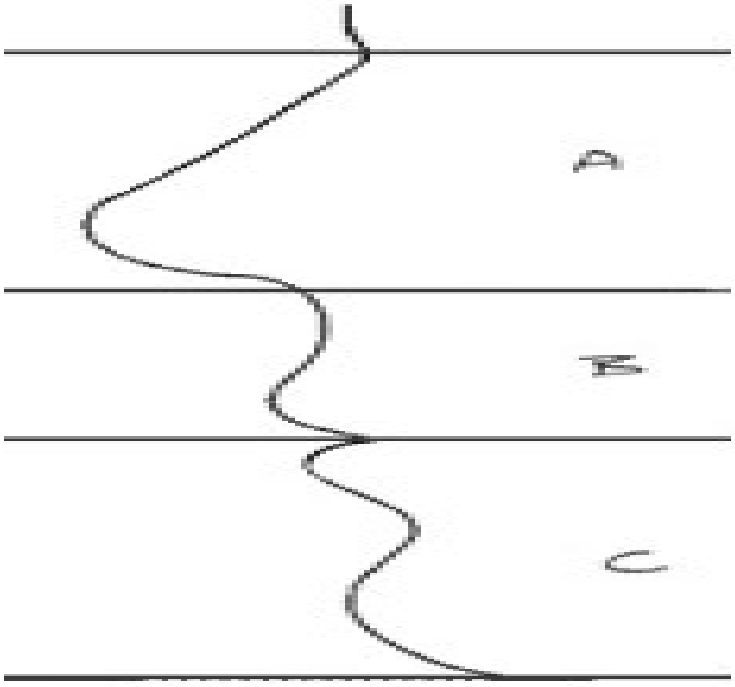
From table 3, each of the groups shows distinct facial features as no two populations or groups have exactly the same dimensions in any of the parameters. Thus sexual and ethnic or tribal variations are clearly demonstrated in all the oro-facial variables.

The study was directed mainly towards investigating the normal values of facial, nasal, maxillary, mandibular and oro-facial heights of adult Bonny people in Rivers State of Nigeria. The ages ranged from 18years to 76years. The choice of age population was deliberate, since the facial growth changes are minimal at that age range (Didia and Dappa, 2005). Significant changes occur at periods between 5 – 17 years (Bishara and Otho, 2000).

The mean facial dimensions of the Bonny male were higher than the corresponding female values; this would most likely be as a result of sexual dimorphism as reported by previous authors on craniofacial studies (Daniel, 2002;Didia and Dappa, 2005;Erika *et al*.,2005;Oladipo*et al*., 2006;Oladipo*et al*.,2008;Ebeye*et al*.,2009).

Many investigators have shown significant differences in craniofacial complex among

Figure.1 Scheme to show measurement of oro-facial parameters.



Note: Nasal height-----A; Maxillary height ----B; Mandibular height-----C; Oro-facial height------B + C; Facial height----------A + B + C

Table.1 Mean oro-facial dimensions of Bonny people

Parameters/Variables	Male Mean± S.D(cm)	Female Mean ± S.D(cm)
Facial Height	11.98 ± 3.44	11.36 ± 0.47
Nasal Height	4.58 ± 0.21	4.42 ± 0.12
Maxillary Height	2.51 ± 0.14	2.39 ± 0.13
Mandibular Height	4.50 ±0.17	4.38 ± 1.48
Oro-facial Height	7.02±0.19	6.74 ± 0.17

S.D = Standard Deviation.; Sample Size: male-500; female-500

Table.2 Result of 'z' test comparingoro-facial parameters of male and female subjects

Parameters/Variables	Z calculated	Z tabulated	Level of significance	Inference
Facial height	1. 72.160	2. 1.96	3. P<0.05	4. significant
Nasal height	5. 46.816	6. 1.96	7. P<0.05	8. significant
Maxillary height	9. 3.475	10. 1.96	11. P<0.05	12. significant
Mandibular height	13. 20.763	14. 1.96	15. P<0.05	16. significant
Oro-facial height	17. 17.341	18. 1.96	19. P<0.05	20. significant

Table.3 Comparative facial dimensions amongst world populations

Parameter	Group	Male	Female	Significance	Author/Year
Facial height (cm)	Nigerians	12.28	11.77	Significant	DidiaandDappa,2005
	Latvians	12.41	11.76	Significant	Erika *et al.*,2005
	Nigerian Ijaws	11.87	10.71	Significant	Oladipo*et al.*,2008
	Urhobos	12.61	11.91	Significant	Ebeye et al.,2009
	Bonny people	11.98	11.36	Significant	Present study
Nasal height (cm)	Nigerians	4.50	4.48	Significant	Didia and Dappa, 2005
	Latvians	5.87	5.67	Significant	Erika *et al.*, 2005
	Nigerian Igbos	6.31	6.04	Significant	Akpa*et al.*, 2003
	Ogonis	3.99	3.91	Significant	Oladipo*et al.*, 2007
	Nigerian Ijaws	4.71	4.43	Significant	Oladipo*et al.*,2008
	Urhobos	4.56	4.27	Significant	Ebeye*et al*.,2009
	Bonny people	4.58	4.42	Significant	Present study
Maxillary height (cm)	Nigerians	2.44	2.30	Significant	DidiaandDappa, 2005
	Nigerian Ijaws	2.49	2.39	Significant	Oladipo*et al*.,2008
	Urhobos	2.68	2.21	Significant	Ebeye*el al*.,2009
	Bonny people	2.51	2.39	Significant	Present study
Mandibular height (cm)	Nigerians	4.49	4.20	Significant	Didia&Dappa, 2005
	Nigerian Ijaws	4.60	4.28	Significant	Oladipo*et al*.,2008
	Urhobos	4.52	4.14	Significant	Ebeye*et al*.,2009
	Bonny people	4.50	4.38	Significant	Present study
Orofacial height (cm)	Nigerians	6.90	6.32	Significant	Didia and Dappa, 2005
	Nigerian Ijaws	7.12	6.50	Significant	Oladipo*et al*.,2008
	Urhobos	6.75	6.36	Significant	Ebeye*et al*.,2009
	Bonny people	7.02	6.74	Significant	Present study

ethnic and racial groups (Hwang *et al*., 2002; Miyajima*et al*., 1996). Several other authors suggested also that genetic factors exert a substantial influence on the individual differences in body shape and configuration(Livhitis*et al*., 1994).

The knowledge of the mean facial dimensions is very important in evaluation of age, sex and racial differences. Plastic surgeons and orthodontics should utilize this knowledge during facial surgery and in recommending orthodontic appliances when facial aesthetics are to be improved upon.

References

Akpa A.O.C, Ugwu .G, Maliki A.O, Aaliki S.B.O; 2003: Morphometric study of the nasal parameter in Nigeria Igbo, Journal of experimental and clinical anatomy 22: 20-29.

Alagoa, E. J 2005. A History of Niger Delta, Port Harcourt: Onyoma Research Publications. en.wikipedia.org/wiki/ibani_tribe

Bartlett S.P, Grossman .R, Whitaker L.A, 1992: Age related changes of the craniofacial skeleton: An anthropometric and histologic analysis, plastic reconstruction surgery, 90:592-600.

Bishara S.E, and Ortho M.S. 2000: Facial and dental changes in adolescents and their conceal implication. Angle Orthodontists, 606: 471-483.

Carkire .B, Hans G.M, and Graham G. 2001: The relationship between craniofacial morphology and obstructive sleep opera in Indians and African- Americans. Amy Respir. C.rt

care Med; 1634: 947-950.

Chung H. K, Marko B. I, Richmond S, Hren N. I, Zhurov A, Udovic M,Melink S,OvsenikM. 2009: Facial morphology of Slovenian and Welsh white populations using 3 dimensional imaging. The Angle Orthodontist; 794:640-5.

Da Vinci L. 1489: Cross Sections of Human Skull. pen and ink. Windsor Royal Library. en.wikipedia.org/wiki/Leonardo_da_vinci

Daniel B. 2002. Racial anthropology and genetics of the Lebanese.www. Nasal indexo fleabanes.com p_p 1-2. Retrieved 22/10/1972.

Di Paolo R. J, Philip C, Maganzini L. A, and Hirce D.J. 1985: The quadrilateral analysis: a differential diagnosis for surgical orthodontics. American Journal of Orthodontics; 8660: 470-82

Didia B.C and Dappa D.V 2005: Facial, nasal, maxillary, mandibular and oro-facial heights of adult Nigerians. 17182: 1-8.

Dong Y, Zhao Y, Bai S, Wu G, Wang Bo 2009: Three-dimensional anthropometric analysis of the Chinese nose. Journal of Plastic, Reconstructive & Aesthetic Surgery; 6311: 1832-1839

Ebeye O. A, Emore E, Ebite E, andIjeh N. J. 2010: Facial Dimensions In Urhobo's Of Nigeria.Internet Journal of Biological Anthropology; 4 1: 1-3.en.wikipedia.org/wiki/Kingdom_of_Bonny

Erika Nagle, UldisTeibe, DzintraKapoka 2005: Craniofacial Anthropometry in a group of healthy Latvian residents. Acta Medical Lituanical; 121: 47-53.

Huntley H.E. 1970: The divine proportion: A study in mathematical beauty Dorer publication; New York. P_p 43.

Jablonski 1992: Dictionary of Dentistry. www.reference.md/files/html.pp: 250

Jefferson 1996: Facial proportions and human health, Journal of general Orthodontics, 2:250-273.

Livnitis G,Moset A. and Yakovenko .K, 1994: Genetics of human body shape and size; body proportion and indices. 292: 271- 289.

Melaven E.A and Rifkin R. 2002: Macio aesthetics: facial and dentofacial . 3011: 839-846.

Miyajima .K, McNamara J.A, Kinura T. 1996: Craniofacial structure of Japanese and European American adults with normal occlusion and well balanced faces. Angle Orthodontics; 110: 431 – 460.

Moestue H. 2008: Can anthropometry measure gender discrimination? An analysis using WHO standards to assess the growth of Bangladeshi children.Public Health Nutrition.

Mohindra, N.K. and J.S. Bulman.2002: The effect of increasing vertical dimension ofocclusion on facial aesthetics. Br. Dent. J.; 19293: 104-168.

Morgan M, Sharland M, and Patton M. A. 1993: Photoanthropometric study of facial growth inNoonan Syndrome. American Journal of Medical Genetics Genetics; 454:430-6

Norman M. R, Hollier L. H, Mackool R. J, Williams K. J, Kim J. H, Longaker M. T, Grayson B. H and McCarthy J. G 2000: Controlled Multiplanar Distraction of the Mandible Part III: Laboratory Studies of Sagittal Anteroposterior and Horizontal MediolateralMovements. Journal of Craniofacial Surgery; 112

Oladipo G.S, Didia B.C, Okoh P.D, and Hart J.S. 2008: Sexual dimorphism in facial dimensions of adult Ijaws.

Journal of experimental and Clinical Anatomy; 72: 10-15.

Oladipo G.S, Gwunireana I.U, and Asawo O.D. 2006: Anthropometric Comparison of Nasal indices between the Igbos and Yorubas in Nigeria. Global Journal of Medical Sciences; 51: 37-40.

Oladipo G.S, Olabiyi A.O, Orernosu A.A, and Norah C.C. 2007: Nasal indices among major ethnic groups in southern Nigeria Scientific Research and Essays; 21: 20-22.

Oladipo G.S, Olotu J.E, and Didia B.C. 2007: Anthropometric study of nasal parameters of the Ogonis in Nigeria. Scientia Africana; 610: 69-71.

Oladipo, G.S., I.U. Gwunireamaand Asawo O. D. 2006: Anthropometric comparison of nasalindices between the Igbos and Yorubas in Nigeria. Global Journal of Medical Sciences; 51: 37-40.

Olotu J. E, Eroje A, Oladipo G. S, andEdibamode E. 2009: Anthropometric Study Of TheFacialAnd Nasal Length Of Adult Igbo Ethnic Group In Nigeria. Internet Journal ofBiological Anthropology; 22: 1-2.

Osunwoke E. A, Amah-Taria F. S, Obia O., Ekere I. M and Ede O. 2011: Sexual DimorphisminFacial Dimensions of Binis of South-Southern Nigeria. Asian Journal of MedicalSciences. 32: 71-73

Rabanus J. 2003: Smile proportion, Golden proportions, http/www.aesthetic density.com/golden proportion htm, pp. 2 of 6.

Reksodiputro M. H, Koento T, Boedhihartono, Sclafani A. P. 2009: Facial AnthropometricAnalysis of the Javanese Female. Arch Facial PlastSurg; 115

Ricketts R.M. 1968: Esthetics, environment, and the law of lip relation. American Journal of Orthodontics; 544: 272-89

Robert Borofsky 2002: The four subfields: anthropologist as Mythmakers American Anthropologist, 1042: 463-480.

Sclafani A. P, Choe K. S, Litner J. A, Yu G. P, Romo T. 2002: The Korean AmericanWoman's FaceAnthropometricMeasurementsand QuantitativeAnalysisofFacialAesthetic s. Arch Facial PlastSurg; 4:252-257.

Sheldon B, Song G.Y, Zhao Z.H, Ding Y, Bai Y.X, Wang L, He H, Shen G, Li W.R, Geng Z, and Xu T.M. 2013. Reliability assessment and correlation analysis of evaluatingorthodontictreatment outcome in Chinese patients. International Journal of OralScience

Shrestha O, Bhattacharya O, Jha N, Dhungel S, Jha C. B, Shrestha S andShrestha U. 2009: Cranio facial anthropometric measurements among Rai and Limbu community of SunsariDistrict, Nepal.Nepal Medical College journal; 113:183-5..