Craniofacial anthropometry requires series of direct standard anthropometric measurement of the bones of the human skull. The study was aimed at establishing baseline data of the craniofacial parameters which are head circumference, intercanthal distances, canthal index and circumference interorbital index of the adult Ogonis of Nigeria. A total of three hundred and eighty two (382) subjects were selected randomly from Kibagha in Gokana local government area, Bori in Khana local government area, Nonwa in Tai local government area and Alesa in Eleme local government area all in Ogoni. Three hundred and eighty two (382) subjects which include one hundred and eighty nine (189) and one hundred and ninety three (193) for males and females respectively with a non-stretchable plastic ruler with 0.5cm interval was used for the measurement and the data. The results showed among others, the mean age value as 30.81±10.13 for male and 32.64±10.91 for female, head circumference (male 56.41±1.52cm, female 57.05±2.02cm), intercanthal distance (male 3.56±0.30cm, female 3.47±0.26), outer canthal distance (male 12.53±0.49cm, female 12.39±0.55cm), canthal index (male 28.41±1.79cm, female 28.15±1.83cm) and circumference inter-orbital index (male 6.31±0.44cm, female 6.09±0.40cm). It showed statistical significant difference between the male and female among the parameters measured indicating sexual dimorphism. Discriminate function analysis of Wilks’ Lambda test also confirms accurateness and predictability of the statistical significant difference of male and female measured variables. The knowledge from the study can provide information for craniofacial assessment for important clinical questions in research especially during surgery on the cranium development forensic investigation in personal identification in the population and society at large.

Keywords: head circumference, inner canthal distance, outer canthal distance, canthal index, circumference interorbital index

Materials and methods
This study was carried out on Ogoni Ethnic group of Rivers State. A total of three hundred and eighty two (382) subjects were selected randomly from Kibagha in Gokana local government area, Bori in Khana local government area, Nonwa in Tai local government area and Alesa in Eleme local government area all in Ogoni. Three hundred and eighty two (382) subjects which include one hundred and eighty nine (189) and one hundred and ninety three (193) for males and females respectively. Subjects with any craniofacial deformity were not selected. The method adopted for assessing the Canthal Index was while the circumference inter – orbital index was. A non-stretchable plastic ruler with 0.5cm interval was used for the measurement and the data were subjected to analysis using SPSS version 20.0.

Result
Table 1 Summarize descriptive statistics of age, head circumference (HC), intercanthal distance (ICD), outer canthal distance (OCD), canthal index (CI) and circumference inter-orbital index (CI-I) in both male and female of Ogonis. The mean results revealed as follows: age (male 30.81±10.13cm, female 32.64±10.91cm), head circumference...
Craniofacial morphometric study of adult Ogoni people of Nigeria

Table 1 Summary of the descriptive statistics of age, HC, head circumference; ICD, intercanthal distance; OCD, outer canthal distance; CI, canthal index; and circumference inter-orbital index (CI-I) in male and female of Ogonis

| Variables | Sample Size | Minimum value | Maximum value | Mean ± SD |
|-----------|-------------|---------------|---------------|-----------|
| Age (years) | 189 | 18 | 18 | 70 | 30.81±10.13 | 32.64±10.91 |
| HC (cm) | 189 | 52.1 | 52.2 | 59.5 | 56.41±1.52 | 57.05±2.02 |
| ICD (cm) | 189 | 2.9 | 2.9 | 4.5 | 3.56±0.30 | 3.47±0.26 |
| OCD (cm) | 189 | 11.4 | 10.8 | 14.2 | 12.53±0.49 | 12.39±0.55 |
| CI | 189 | 24.59 | 24 | 33.6 | 28.41±1.79 | 28.15±1.83 |
| CI-I | 189 | 5.3 | 5.1 | 7.73 | 6.31±0.44 | 6.09±0.40 |

Table 2 Results of paired sample Test (z-test) of craniofacial parameters in male and female Ogonis at confidence interval of 95% (P=0.05)

| Variables | P-values | Degree of freedom | z-values (t-calculated) | Inference |
|-----------|----------|------------------|------------------------|-----------|
| Age | 0.069 | 188 | 1.83 | Significant (2-tailed) |
| HC | 0 | 188 | 3.678 | Significant (2-tailed) |
| ICD | 0.003 | 188 | 2.99 | Significant (2-tailed) |
| OCD | 0.008 | 188 | 2.674 | Significant (2-tailed) |
| CI | 0.183 | 188 | 1.337 | Significant (2-tailed) |
| CI-I | 0 | 188 | 4.906 | Significant (2-tailed) |

Table 3A A comparison of Canthal Index in male and female Ogonis and other Nigerian Populations previously studied

| Authors/years | Population | Canthal Index (male) | Canthal Index (female) |
|---------------|------------|----------------------|------------------------|
| Oladipo et al. | Bayelsa | 30.01±1.33 | 30.01±1.07 |
| Nzeakor et al. | Ika North and South | 30.93±3.30 | 30.73±2.87 |
| Dennis et al. | Urhobo | 37.12±2.78 | 36.84±2.60 |
| Oladipo et al. | Ibiobio | 31.64±2.57 | 31.47±4.62 |
| Oladipo et al. | Igb | 35.15 | 32.59 |
| Egwu et al. | Igb | 37.10±2.93 | 36.41±2.69 |
| Oladipo et al. | Urhobo | 24.38±1.96 | 29.38±1.37 |
| Oladipo et al. | Itsekiri | 26.03±1.46 | 27.7±1.35 |
| Present study | Ogonis | 28.41±1.79 | 28.15±1.83 |

Table 3B A comparison of circumference inter-orbital index in male and female Ogonis and other Nigerian Populations previously studied

| Authors/years | Population | Circumference inter-orbital index (male) | Circumference inter-orbital index (female) |
|---------------|------------|----------------------------------------|------------------------------------------|
| Dennis et al. | Urhobo | 7.15±0.74 | 7.12±0.68 |
| Chukwuajwu et al. | Igbos | 10.62±0.61 | 10.49±0.74 |
| Aniboro et al. | Isoko | 6.62±0.38 | 6.58±0.10 |
| Oladipo et al. | Ijaw | 7.80±2.20 | 8.10±0.60 |
| Oladipo et al. | Igbos | 6.20±0.50 | 6.50±0.36 |
| Present study | Ogonis | 6.31±0.44 | 6.09±0.40 |

Citation: Oladipo GS, Uzomba GC, Alabi AS, et al. Craniofacial morphometric study of adult Ogoni people of Nigeria. J Appl Biotechnol Bioeng. 2018;5(5):311–314. DOI: 10.15406/jabb.2018.05.00156
Table 4: Discriminate function analysis of Wilks’ Lambda test for predictability into group membership

| Test of Function(s) | Wilks’ Lambda | Chi-square | df | Sig. | Remarks |
|---------------------|---------------|------------|----|------|---------|
| Canthal Index       | 0.984         | 5.997      | 1  | 0.014| Significant |
| C.IJ                | 0.933         | 26.171     | 1  | 0    | Significant |

Discussion

Craniofacial anthropometry requires series of direct standard anthropometric measurement of the bones of the human skull. The present study provided a baseline information of craniofacial anthropometry of male and female of Ogonis with respect to their mean values of head circumference, intercanthal distances, outer canthal distance, canthal index and circumference interorbital index. The presence of sexual dimorphism in this study agreed with other studies that compared craniofacial characteristics of male and female and also showed significant difference in the craniofacial parameters of male and female Ogonis at the significant level of $P=0.05$.

From the result of the present study, the canthal index of the female mean is similar with work done by Oladipo et al., on female Itskiri who reported the mean value as $27.7\pm1.35$, however, it is not in agreement with the research work done by Oladipo et al., on male Urhobo and Itskiri who documented their values as $24.38\pm1.96$ and $26.03\pm1.46$ respectively. It also differed with the work done by Oladipo et al., who have the mean values of Bayelsans as $30.01\pm1.33$ for male and $30.01\pm1.07$ for female. In line with this, Nzeakoret et al., documented the mean values of Ika North and South male ($30.93\pm3.30$) and female ($30.73\pm2.87$). This research did not concur with the work done by Dennis et al., on the male and female Urhobo population as their values were (male $37.12\pm2.78$ and female $36.84\pm2.60$). Igbo population also presented the highest value in canthal index (37.10±2.93 for male and 36.41±2.69 for female).12,14

The result of the research into interorbital index similar with the work carried out by Oladipo et al., on Igbo who documented their mean values as (male 6.20±0.50 and female 6.50±0.20). Another research study done by Oladipo et al., on the Southern Nigeria with the male and female values of 6.30±6.53 and 6.50±0.36 respectively also agreed with the present study. The present study also agreed with the research investigation done by Anibor on the male and female Isoko population which has the mean values of male as 6.62±0.38 and female as 6.58±0.10. Conversely, the present disagreed with the done by Dennis et al., on the Urhobo population as (male 7.15±0.74 and female 7.12±0.68) and Chukwujekwu et al., on Igbo population which has their values of male and female as 10.62±0.62 and 10.49±0.74 respectively. Research work done by Oladipo et al., on Ijaws also did not agree with the present study.

Discriminate function analysis of Wilks’ Lambda test was used for predictability into group membership of male and female craniofacial parameters. It revealed that all the predictors add certain predictive power to the discriminate functions showed significant difference at $P<0.001$, which confirms accurateness and predictability of the statistical significant difference of male and female measured variables.

Conclusion

The present study has established baseline information for male and female craniofacial parameters of Ogonis which may serve as useful source for preliminary identification purposes especially in settings that encourage forensic investigation. The variation in this study could be accrued to genetics and environmental factors within and between populations. The findings of this study, therefore has the ability for provision of craniofacial assessment, helps to provide important clinical questions in research especially during surgery on the cranium development, it would also provide forensic investigation in personal identification in the population and society at large.

Acknowledgements

None.

Conflict of interest

The author declares no conflict of interest.

References

1. Mahfouz KJ. Craniofacial anthropometry of a group of Resident of New Delhi in India. 1988;33:243–247.
2. Oladipo GS, Yorukins LS, Okoh P. Measurements of Head Circumference, Intercanthal Distances, Canthal Index and Circumference Interorbital Index of Ikwere School Children in Nigeria. Journal of Natural Science Research. 2013;3(4):16–20.
3. Oladipo GS, Ugbona A, Oyakhire M. The circumference Interorbital index of Ijaw and Igbo ethnic groups in Nigeria. Int J Biol Anthropol. 2008;3(2).
4. Didia BC, Dopper DV. Facial, Nasal, Maxillary, Mandibular and Orofacial heights of adult Nigerians. Orient J Med. 2005;17:1–8.
5. Williams PL, Bannister LH, Dyson M, et al. Gray’s Anatomy. 38th ed. Edinburgh, London: Churchill Livingstone; 1995. p. 609–12.
6. Anderson AL. Accurate clinical means of measuring intervital axis distance. Arch Ophthamol. 1954;52(3):349–352.
7. Oladipo GS, Igipansi UN, Alabi AS, et al. Measurements of Head Circumference, Intercanthal Distances, Canthal Index and Circumference Interorbital Index of Children and Adolescents in Bayelsa State in Nigeria. World J Pharmaceuts Rev. 2017;6:207–218.
8. Nzeako HC, Emegokar CD, Ezejindu DN, et al. Anthropometric Variations Of The Inner And Outer Canthal Distances Between Adult Male And Female In Ika North And South Local Government Of Delta State. Citejeb J Bio–Protocols. 2017;6:1–5.
9. Dennis EO, Ejob EO, Ogbor–Emorice, et al. Anthropometric study of canthal and circumference interorbital indices among young Urbobo adults in South–South Nigeria. Annals of Bioanthropol. 2015;3(2):42–46.
10. Oladipo GS, Akande PA, Osogba IG, et al. Anthropometric studies of inner canthal distance, outer canthal distance and canthal index of adult ibibios. Asian J Med Sci. 2011;3:14–16.
11. Oladipo GS, Fawehinmi HB, Sulemain YA. The study of nasal parameters (nasal height, width and nasal index) among the Yorubas of Nigeria. Int J Biol Anthropol. 2009;3:1–19.

Citation: Oladipo GS, Uzomba GC, Alabi AS, et al. Craniofacial morphometric study of adult Ogoni people of Nigeria. J Appl Biotechnol Bioeng. 2018;5(5):311–314. DOI: 10.15406/jabb.2018.05.00156
12. Egwu OA, Ewunonu EO, Eteudo AN, et al. Normal values of inner and outer intercanthal distances in a student population in southeast Nigeria. *Int J Bio Chem Sci.* 2008;2(3):355–358.

13. Chukwujekwu IE, Ezegjiu DN, Adweye OI. Study of head circumference inter orbital index between the ages of 19–29 years of Igbo Tribes in Otolo, Okofia, Nnewi, Anambra State, Nigeria. *Int J Res.* 2014;1:239–244.

14. Anibor E, Omokaro E, Ofere F. Variations In Canthal Index Of The Isoko In Delta State. *Int J Basic Appl Inno Res.* 2014;3(4):143–146.

15. Oladipo GS, Okoh PD Hart JS. Anthropometric study of Ocular Dimension in Adult Ijaw of Nigeria. *Res J Med Med Sci.* 2010;5:121–124.