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Angular Photometric Analysis of Gokana Adult Females in Rivers State

¹Osunwoke EA, ²Lagolewe B and ³Lelei SA

^{1&2}Department of Anatomy, Faculty of Basic Medical Sciences,
College of Health Sciences, University of Port Harcourt

³Department of Physiology, Faculty of Basic Medical Sciences,
Niger Delta University

Corresponding Author: Osunwoke EA

E-mail: emeka.osunwoke@uniport.edu.ng; +234(0)8055160338

ABSTRACT

It is an accepted fact that the facial norms for different ethnic groups can differ widely. So there is need to establish specific anthropometric data for facial study for population with different ethnic background. The aim of this study is to determine the facial characteristics of adult Kalabari females using photometric facial analysis. Standardized photographic records were taken from 134 adult Gokana females in both frontal and lateral views at a distance of 120 cm in a natural head position (NHP) and analysed using Pro Image Analyser. The mean \pm standard error of mean of the nasofrontal angles, nasolabial, nasofacial, nasomental and mentocervical angles are $140.6 \pm 0.86^\circ$, $85.7 \pm 1.45^\circ$, $29.5 \pm 0.44^\circ$, $132.5 \pm 0.68^\circ$ and $90.7 \pm 0.94^\circ$ respectively. Some unique facial features such as less chin, less prominent nose and glabella were observed in this population of study when compared with the some other populations. The results of this study could be useful to clinicians, orthodontics, facial surgeons and forensic scientists.

Key words: Angular, photometric analysis, Gokana adults.

INTRODUCTION

Over the years, various methods have been used to evaluate these facial characteristics such as anthropometry and photogrammetry^{1&2}. An understanding of the soft tissues and the normal range enables a treatment plan to be formulated to normalize the facial traits to a given individual³. Facial beauty analysis can be characterized as a combination of symmetry, proportions and harmonious relationship among the structures⁴. Various methods have been used to evaluate facial characteristics such as cephalometric radiography⁵, stereophotometry⁶, computer tomography and laser scanning⁷. Oyinbo *et al.* carried out normal outer and inner canthal measurements for the Ijaws of southern Nigeria and the Igbos of south-eastern Nigeria. They found out that there were significant differences between the two ethnic groups ($P < 0.05$)⁸. In a society focused on youth and beauty, individuals with less visible disfigurements have higher self-esteem and can effectively socialize with peers and members of the sex^{9&10}.

Legan and Burstone described the angle of convexity which is formed by soft tissue glabella, subnasale and soft tissue pogonion¹¹. Hussein *et al.* reported that the mean morphological facial height of Indian American women was less than that of North American white women¹². A study to quantify the facial soft tissue profile of Ikwerre children between the ages of 5 and 12 have been conducted, *African American woman and Javanese females*^{13, 14, 15}. In a study by Fang *et al.* on

measured facial proportion from various ethnic groups, they found out that the greatest inter-ethnic variability in facial proportions exists on the ethnic group and are also present in the measurement of the eyes, nose and mouth. There was no significant difference between sexes in the neoclassical facial proportions¹⁶. In a study done by Osunwoke and Paul, which was aimed at ascertaining the facial norms that define the linear parameters with respect to photometric analysis of the Isoko adults, significant differences were observed in all other measured parameters except for the facial width¹⁷.

The aim of this study is to determine the facial characteristics of adult Kalabari females using photometric facial analysis.

MATERIALS AND METHODS

The population of study used for this research are adult males whose origin is from the Gokana people. Subjects were within the age range of 18-45. Parents and grandparents (up to the second generation) of subjects were ensured to originate from Gokana for them to be qualified for this study. Individuals who had undergone any form of facial surgery were not included in this study as this may lead to error in this research. A sample of 134 female subjects were randomly selected. Aside from confirming that the subjects are from Gokana, a brief questionnaire that included names, age, origin of parent and grandparents, and history of facial

or dental surgery, was issued. Also, an informed consent of the subject was sought by enlightening them about the purpose and procedures involved in the study. A photograph was set up and it comprised of a tripod supporting a digital camera (Sony Cyber-shot DSC-W630). Adjustment of the tripod height allowed the optical axis of the lens to be maintained in a horizontal position during the capture. The subject was asked to assume a relaxed standing position, with both hands hanging beside the trunk. The subject was positioned on a line marked on the floor. The distance between the mark on the floor and the tripod was measured using a metre rule and the measurement was 120 cm. Also, 100

cm in front of the subject on the opposite was a mirror. The subject was asked to look into the mirror with their lips relaxed, eyes fully opened and face relaxed so that both the front and side view profile were taken in the natural head position before every recording. The camera operator ensured that the subject's forehead, neck and ear are clearly visible and their lip in repose. The digital photos were stored after being recorded on external memory for further processing.

Data Analysis: Images were analyzed using the IMG pro image analyzer. The data obtained were processed using Z- test and tabulated.



Figure 1:Nasomental Angle



Figure 2: Nasofacial Angle



Figure 3: Mentocervical angle



Figure 4: Nasolabial angle



Figure 5: Nasofrontal angle

RESULTS

The results of this study are shown in the tables below. Table 1. Table showing the mean and the standard error of mean. The mean \pm standard error of the nasofrontal angle is $140.6 \pm 0.86^\circ$, nasolabial angle is $85.7 \pm 1.45^\circ$,

nasofacial angle is $25.9 \pm 0.44^\circ$, nasomental angle is $132.5 \pm 0.68^\circ$ and mentocervical angle is $90.7 \pm 0.94^\circ$. Table 2. Table showing Comparison of measured parameters with other population.

Table 1: Mean and the standard error of mean of measured parameters

Angular Parameters ($^\circ$)	No. of Samples	Mean \pm S.E ($^\circ$)
Nasofrontal Angle	134	140.6 ± 0.86
Nasolabial Angle	134	85.7 ± 1.45
Nasofacial Angle	134	25.9 ± 0.44
Nasomental Angle	134	132.5 ± 0.68
Mentocervical Angle	134	90.7 ± 0.94

Table 2: Comparison of measured parameters with other population.

Author/Date /Age range (yrs)	Population	NF	NFR	NL	NM	MC
Present study, 2019 (18-45)	Gokana females	29.52 ± 0.44	140.6 ± 0.86	85.7 ± 1.45	132.5 ± 0.68	90.7 ± 0.94
Ukoha et al, 2017 (18-35)	Igala	38.65 ± 4.89	130.93 ± 7.34	79.29 ± 11.40	127.41 ± 5.61	
Mussammat et al, 2013 (18-35)	Bangladeshi Garo	38.67 ± 4.05	137.96 ± 4.79	91.92 ± 8.90	132.79 ± 5.10	
Malkoc et al, 2009 (18-30)	Turkish		148.61 ± 6.66	102.94 ± 10.43		
Oghenemavwe et al., 2010 (18-35)	Urhobo	35.60 ± 7.46	127.85 ± 8.50		126.55 ± 6.93	
Osunwoke & Onyeriodo, 2014 (18-45)	Khana	32.09 ± 3.61	137.36 ± 6.37	86.21 ± 16.61	130.97 ± 5.68	93.76 ± 9.59
Ezeuko and Eboigbe, 2015 (18-30)	Bini	34.3 ± 0.2	133.8 ± 0.4	77.08 ± 1.5	128.1 ± 0.3	

NFR= Nasofrontal angle, NF = Nasofacial angle, NM = Nasomental angle, NL = Nasolabial angle
MC = Mentocervical angle

DISCUSSION

The present study showed that the mean nasomental angle is in consonance with the findings of Mussammat et al., on the adult Bangladeshi Garo females¹⁸, Osunwoke and Onyeriodo on adult Khana females¹⁹ thus indicating that the Gokana females have a platyrrhine nose type which means they have a broad and flat nose. The mean nasomental angle is larger than that reported by Oghenemavwe et al., on the adult Urhobos females²⁰, Ukoha et al., on adult Igala females²¹, Ezeuko and Eboigbe on adult Bini females²². As stated by Ukoha et al., wider nasomental angle suggests a more prominent chin²¹, therefore the value of the mean of the present study suggests a more prominent chin.

The mean nasofacial angle for the Gokana females was lower than that obtained for other female populations such as that reported by Ukoha et al., on the Igala females²¹, Mussammat et al., on Bangladeshi Garo females¹⁸, Oghenemavwe et al., on the Urhobos females²⁰, Osunwoke and Onyeriodo on Khana females¹⁹, Ezeuko and Eboigbe on the Bini females²². As stated by Wamalwa *et al.*, a high nasofacial angle suggests a greater projection of the nose²³. This shows that the adult Gokana females have lower projections of their nose and thus a depressed nasal ridge.

While for the nasofrontal angle found in Gokana females, the mean value obtained was similar to that obtained by Mussammat et al., for the Bangladesh Garo females¹⁸, Osunwoke and Onyeriodo for the Khana females¹⁹. However, it was higher than that reported by Ukoha et al., for the Igala females²¹, Ezeuko and Eboigbe for Bini females²².

Meanwhile the nasofrontal angle reported by Malkoc et al., for Turkish females was higher than that of our present study²⁴. The average value of the mentocervical angle in our present study was lower compared to the values obtained by Oghenemavwe et al., on the Urhobo females²⁰ and Osunwoke Onyeriodo on the Khana females¹⁹.

According to Walmawa et al., the nasolabial angle evaluating the relationship of the nasal base and upper lip, is one of the measurements with greater clinical relevance during orthodontic diagnosis and treatment planning because its magnitude depends on the antero-posterior position and inclination of the upper anterior teeth, and it can be altered by orthodontics or orthognathic surgery²³. The mean nasolabial angle for the Gokana females was in line with that reported by Osunwoke and Onyeriodo on Khana female population¹⁹. However, the mean nasolabial angle in the studies by Ukoha et al., on the Igala females and Ezeuko and Eboigbe on the Bini females was lower than that reported in our present study^{21, 22}. But the mean nasolabial angle of our present study was lower than that gotten by Mussammat et al., for Bangladeshi Garo female population, and Malkoc et al., for Turkish

female population^{18,24}.

The acute angle ($< 90^\circ$) noted in the Nasolabial and Nasofacial angles of the Gokana adult female indicates that they possess a downwardly oriented nose which is slightly broad and flat. Thus, they are said to possess a platyrrhine type of nose. The obtuse angle ($> 90^\circ < 180^\circ$) noted in the Nasofrontal angle, Nasomental angle and Mentocervical indicates a prominent glabella and chin which shows that they have a bigger lower face.

CONCLUSION

This study has provided the mean angular facial dimensions of adult female Gokana people of Rivers state, Nigeria and also revealed that there are racial differences in facial dimensions of adult female populations around the world. It will also serve as reference for orthodontics and plastic surgeons.

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