



## SHORT COMMUNICATION

DOI: <http://dx.doi.org/10.142598/tcb.v2i2.126>

## Photometric Facial Analysis of Soft Tissue Profile of Adult Efiks

EA OSUNWOKE\*, A OLAIFA-OLAIBI

*Department of Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, University Port Harcourt, Nigeria.***Article Info:** Received: May 7th, 2014; Revised: May 25th, 2014; Accepted: May 28th, 2014

### ABSTRACT

**Background:** It has been established that self-esteem is strongly dependent on facial appearance. **Aim:** This study was aimed at determining the soft tissue facial norms of Efik adults by photometric analysis. **Methods:** Standardized photographic records of 364 (248 males, 116 females) Efik adults between 18-45 years were taken in the natural head position using a digital camera. The measured parameters were forehead height (Trichion-Glabella), special upper face height (Glabella-Subnasale), nasal height (Nasion-Subnasale), lower face height (Subnasale-Menton) and maximum facial width (Zygoma-Zygoma). **Results:** The mean Trichion-Glabella distance in males was  $70.72 \pm 11.46$  mm and  $93.43 \pm 18.85$  mm in females, Glabella-Subnasale  $79.5 \pm 9.65$  mm in males and  $107.28 \pm 16.32$  mm in females, Nasion-Subnasale  $57.3 \pm 6.8$  mm in males and  $74.8 \pm 12.45$  mm in females, Zygoma-Zygoma  $177.64 \pm 16.04$  mm in males and  $173.31 \pm 16.28$  mm in females, Subnasale-Menton  $89.22 \pm 11.8$  mm in males and  $114.46 \pm 16.7$  mm in females. There was sexual dimorphism in all measured parameters ( $p < 0.05$ ) with the females having significantly higher values than the males except in the maximum facial width. **Conclusion:** This study has shown that vertical linear variables that define the soft tissue profile are sexually dimorphic. This study could be useful in orthodontics and facial plastic surgery.

**Keywords:** Efiks, Facial width, Forehead height, Nasal height

### INTRODUCTION

aesthetics have begun to change worldwide as technology has facilitated global communication. In more socially and ethnically diverse countries such as the United States, there appears to be a rebirth in ethnic pride [2]. A single standard of facial aesthetic is not appropriate for application to diverse racial and ethnic groups. Consequently, researches on craniofacial study of different ethnic groups are on-going to establish ethnic specific anthropometric data [3]. Morphological features of different races and ethnic groups are not randomly distributed but appear in geographical cluster thus there is a need for facial study of different ethnic groups to establish specific anthropometric data for populations with different ethnic backgrounds [4]. Soft tissue profile standards using

photogrammetry have been reported for North American population [5], Pakistani [6], Indians [7], Serbians [8], Croatians [9] and Turkish [10]. In literature, several studies have been carried out to determine facial traits of African tribes [11-17]. Different research groups have defined different soft tissue parameters and landmarks of soft tissue facial analysis [18-21].

Facial traits are largely influenced by race, ethnic group, age, sex and culture [22,23]. The face is divided into aesthetic units that are further divided into subunits. The major units that are classically defined for facial analysis include the forehead, eyes, nose, lips, chin, ears and neck [24]. Currently, major parameters used in facial aesthetics are based on Powell and Humphreys [5]. These authors formulated suitable relationships between the face and the nose and defined facial angles. The facial angles include the nasofacial, nasofrontal, nasolabial, nasomental and the mentocervical angles [25]. Czarnecki *et al.*, evaluated the perception of facial balance by varying chin development, lip protrusion, and the length of the nose. They found that the interrelationships of

\*Corresponding Author

Dr. EA Osunwoke

*Department of Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, University Port Harcourt, Nigeria.*Ph: +23 48055160338; Email: [acosunwoke@yahoo.com](mailto:acosunwoke@yahoo.com)

these facial features must be in equilibrium in order to achieve facial harmony [26]. Legan and Burstone described the angle of convexity which is formed by soft tissue glabella, subnasale and soft tissue pogonion [27]. The Powell analysis, which is made up of the nasofrontal, nasofacial, nasomental, and mentocervical angles, has been developed to provide an insight into an ideal facial profile [5].

Against this background, the present study was carried out to establish norms for photometric analysis of soft tissue profile in adult Efiks from standardized photographs.

## MATERIALS AND METHODS

A total population of 364 adults from Cross Rivers State, South-Southern part of Nigeria comprising 248 males and 116 females (ages 18-45) who are Efiks by both parents and grandparents, showing no form of facial deformities or scars and have not been involved in any form of plastic or reconstructive surgery were randomly selected for this study. Five soft tissue parameters were measured and these include the following:

1. **Forehead Height (Th-G):** This is the measured distance between the trichion (Tr) and the glabella (Gl).
2. **Special Upper Face Height (G-Sn):** This is the measured distance between glabella (G) and subnasale (Sn) .
3. **Nasal Height (N-Sn):** This is the measured distance between the nasion and subnasale.
4. **Lower Face Height:** This is the distance between the subnasale (Sn) and menton (M) expressed in percent ratio by dividing it with the distance from nasion (N) to menton (M) and multiplying by 100 (i.e.,  $\text{Sn-M/N-M} \times 100$ ).
5. **Facial Width (Bizygomatic breath):** This is the distance between the two most lateral points of the zygomatic arches.

After informed consent has been obtained from the volunteer subjects, standardized photographs of the lateral and frontal view of the face were taken in the natural head position (NHP). The photographic set-up consist of a tripod (A300) supporting a digital camera (SONY Cyber-shot DSC-W180). The adjustment of the tripod height allows the optical axis of the lens to be maintained in a horizontal position. To obtain the photographs the subject was asked to relax with both hands hanging beside the trunk. The subject was positioned on a line marked on the floor 100cm from the camera and placed behind the subject is a calibrated background sheet that allows measurement at life size. 120 cm in front of the subject on the

opposite side was a mirror. The subject had to look into the reflection in the mirror with their lips relaxed so that both the front and side view can be taken in the natural head position before every recording. The operator ensured that the subject's forehead, neck and ears were clearly visible.

Images were analysed using IMG pro image analyser. Statistical analysis was performed using the Z-test. T-test was used to determine sexual dimorphism. The reproducibility and reliability of the measurements were analysed using the Dahlberg's (1940) formula that determines the method of error (M.E).

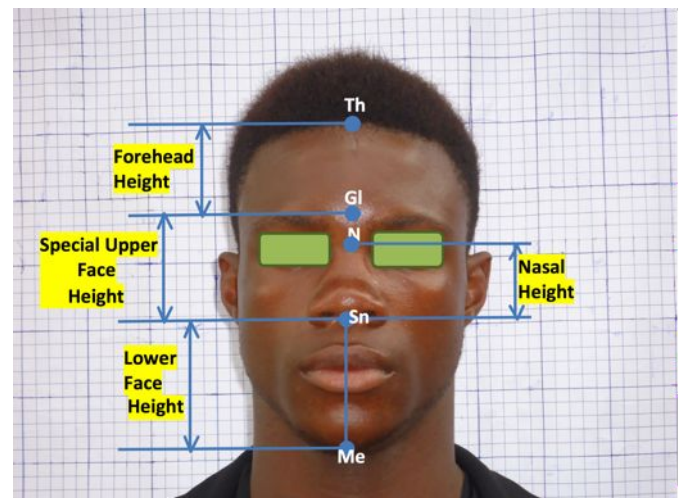


Figure 1: Soft tissue points with measurement descriptions.

## RESULTS

The mean measured values for males and females are shown in Table 1. All parameters showed statistically significant differences ( $p < 0.05$ ) and sexual dimorphism. All parameters were seen to be higher in females compared to the males except in the maximum facial width.

Table 2 shows the result of the method error using the Dahlberg's (1940) formula to be of low acceptable error for all the parameters.

## DISCUSSION

This study has revealed the vertical linear variables that define the soft tissue profile in Efik ethnic group of Nigeria using standardized photogrammetry record taken in the natural head position. All measured parameters showed significant gender difference which was higher in females except for the facial width which was higher in the males.

The higher distances from the trichion to glabella of the female Efiks implies a higher forehead height compared to the males. Sexual dimorphism was observed. This is not in line with the

**Table 1:** Descriptive statistics for facial parameters based on sex

| Parameter  | N   | Sex | Mean±SD(mm)  |
|------------|-----|-----|--------------|
| Th-Gl (mm) | 248 | M   | 70.72±11.46  |
|            | 116 | F   | 93.43±18.85  |
| Gl-Sn (mm) | 248 | M   | 79.5±9.65    |
|            | 116 | F   | 107.28±16.32 |
| N-Sn (mm)  | 248 | M   | 57.3±6.8     |
|            | 116 | F   | 74.8±12.45   |
| Sn-Me (mm) | 248 | M   | 89.22±11.8   |
|            | 116 | F   | 114.46±16.7  |
| F-W (mm)   | 248 | M   | 177.64±16.04 |
|            | 116 | F   | 173.31±16.28 |

study on the Turkish population and Pakistani population by Omur *et al.*, and Abida *et al.*, respectively where no significant difference was seen in both sexes [6, 10].

The distance between the glabella and subnasale in this study gives an implication of a higher special upper head height amongst the females compared to the males, this agrees with the work on sexual dimorphism between these parameters as has been reported among the Turkish population [10]. The distance between the nasion to subnasale in the males is lower compared to the females which alludes that the males have a shorter nose length compared to the females. The Efiks are seen to have a higher nose length when compared to other reported ethnic groups (Binis, Okrikas, Ijaws, Igbos) in Nigeria as reported by various authors [12-14, 17]. The long nose feature found among the Efiks is a similar characteristic feature of the Turkish people living in the Black sea region as reported by Uzun *et al.* [28].

The distance between the subnasale and menton is seen to be lower in the males compared to the females, thus suggesting that

the females have a larger lower face length compared to the males. Significant difference was observed in the males and females. This is not in line with the report of the study on the Binis where the males had a larger lower face length compared to the females. The Efiks were also observed generally to have a larger lower face length compared to the Binis.

The distance between the two most lateral points of the face that is the gap between the two lateral Zygoma points is seen to be higher in males compared to the females. Significant difference was observed in the males and females. This correlates with the study done on the Binis where sexual dimorphism was observed.

These differences that have been seen to exist between the sexes have been reported by some authors to be as a result of genetic make-up and inheritance which manifest as sexual dimorphism [29].

Racial and ethnic differences in the facial structure are well-accepted facts. The correct concept for aesthetics for a Brazilian Negroid facial trait is different from that of a Nigerian Negroid. Hence, it is imperative that efforts should be made to establish general norms for different races and ethnic groups with consideration of certain individual characteristic features. This study has shown as in most other populations, that the vertical linear variables of tissue profiles are sexually dimorphic amongst the Efiks of Nigeria.

## CONCLUSION

The knowledge of the facial characteristics (linear parameters) of the Efik people adds to the existing data for the Nigerian population. The data presented in this study will serve as a reference point for plastic surgeons and clinicians and a baseline for further study.

## ACKNOWLEDGEMENT

I wish to acknowledge the natives of Henshaw town, Duke town, Akpabuyo town, and Tinapa all of Nigeria, for their patience, availability and agreement to make this research a success.

**Table 2:** Test for reliability of methods and method errors

|       | Mean±SD     | Method Error | Inference            |
|-------|-------------|--------------|----------------------|
| Th-Gl | -1.05±1.34  | 0.82         | Acceptable low error |
| Gl-Sn | 1.02±1.16   | 0.75         | Acceptable low error |
| N-Sn  | -0.46±1.50  | 0.75         | Acceptable low error |
| Sn-Me | -1.10± 2.39 | 1.26         | Acceptable low error |
| F-W   | 0.90±1.15   | 0.71         | Acceptable low error |

## REFERENCES

1. Hershon LE, Giddon DB: **Determinants of facial profile self-perception.** *American journal of orthodontics* 1980, **78**:279-295.
2. Thomas RG: **An evaluation of the soft-tissue facial profile in the North American black woman.** *American journal of orthodontics* 1979, **76**:84-94.
3. Proffit WR, Fields W: **Contemporary orthodontics**, 2000. Mosby Company.
4. Krishan K, Kumar R: **Determination of stature from cephalo-facial dimensions in a North Indian population.** *Legal medicine* 2007, **9**:128-133.
5. Powell N, Humphreys B: *Proportions of the aesthetic face*: Thieme-Stratton New York; 1984.
6. Abida I, Junaid I: **Linear photogrammetric analysis of the adult soft tissue profile.** *Pakistan oral & dental Journal*, 2006, **26** (2): 183-190
7. Jain S, Anand C, Ghosh S: **Photometric facial analysis-a baseline study.** *J Anat Soc (India)* 2004, **53**:11-13.
8. Jeremić D, Kocić S, Vulović M, Sazdanović M, Sazdanović P, Jovanović B, Jovanović J, Milanović Z, Donović N, Simović A: **Anthropometric study of the facial index in the population of central Serbia.** *Archives of Biological Sciences* 2013, **65**:1163-1168.
9. Anić-Milošević S, Lapter-Varga M, Šljaj M: **Analysis of the soft tissue facial profile by means of angular measurements.** *The European Journal of Orthodontics* 2008, **30**:135-140.
10. Ömür K, Burak G, Murat A, Ferhan E, İlter K: **Morphometric Facial Analysis of Turkish Adults.** *Balikesir Saglik Bil Derg* 2012, **1**:7-11.
11. Didia BC, Dapper DV: **Facial, nasal, maxillary, mandibular, and oro-facial heights of adult Nigerians.** *Orient Journal of medicine* 2005, **17**:1-8.
12. Anibor E, Okumagba MT, Onodaro E: **The Facial and Nasal Height of the Ijaw Ethnic Group in Delta State of Nigeria.**
13. Osunwoke E, Amah-Tariah F, Obia O, Ekere I, Ede O: **Sexual Dimorphism in Facial Dimensions of the Bini's of South-Southern Nigeria.** *Asian J. Med. Sci* 2011, **3**:71-73.
14. Osunwoke E, Omin E: **Photometric Facial Analysis of Soft Tissue Profile of Okrika Adults.** *Annual Research & Review in Biology* 2014, **4**:1980-1987.
15. Oghenemaywe A, Osunwoke S, Omovigho O: **Photometric analysis of soft tissue facial profile of adult Urhobos.** *Asian J Med Sci* 2010, **2**:248-252.
16. Oladipo GS, Esomonu C, Osogba IG: **Craniofacial dimensions of Ijaw children and adolescents in Nigeria.** *Biomedicine International* 2009, **1**.
17. Joy O, Ahmed E, Gabriel O, Ezon-ebidor E: **Anthropometric study of the facial and nasal length of adult Igbo ethnic group in Nigeria.** *Internet Journal of Biological Anthropology* 2009, **2**.
18. Burstone CJ: **The integumental profile.** *American Journal of Orthodontics* 1958, **44**:1-25.
19. Subtelny J: **A longitudinal study of soft tissue facial structures and their profile characteristics, defined in relation to underlying skeletal structures.** *American Journal of Orthodontics* 1959, **45**:481-507.
20. Lines PA, Lines RR, Lines CA: **Profilemetrics and facial esthetics.** *American journal of orthodontics* 1978, **73**:648-657.
21. Holdaway RA: **A soft-tissue cephalometric analysis and its use in orthodontic treatment planning. Part I.** *American journal of orthodontics* 1983, **84**:1-28.
22. Mandall N, McCord J, Blinkhorn A, Worthington H, O'Brien K: **Perceived aesthetic impact of malocclusion and oral self-perceptions in 14-15-year-old Asian and Caucasian children in greater Manchester.** *The European Journal of Orthodontics* 2000, **22**:175-183.
23. Sağlam AMŞ, Gazilerli Ü: **Analysis of Holdaway soft-tissue measurements in children between 9 and 12 years of age.** *The European Journal of Orthodontics* 2001, **23**:287-294.
24. Flint PW, Cummings CW, Haughey B, Lund V, Niparko J, Richardson M: *Cummings otolaryngology head & neck surgery*: Mosby; 2010.
25. Eliakim-Ikechukwu CF, Ekpo AS, Etika M, Ihentuge C, Mesembe OE: **Facial Aesthetic Angles of the Ibo and Yoruba Ethnic Groups of Nigeria.**
26. Czarnecki ST, Nanda RS, Currier GF: **Perceptions of a balanced facial profile.** *American Journal of Orthodontics and Dentofacial Orthopedics* 1993, **104**:180-187.
27. Legan HL, Burstone CJ: **Soft tissue cephalometric analysis for orthognathic surgery.** *Journal of oral surgery (American Dental Association: 1965)* 1980, **38**:744-751.
28. Uzun A, Akbas H, Bilgic S, Emirzeoglu M, Bostancı O, Sahin B, Bek Y: **The average values of the nasal anthropometric measurements in 108 young Turkish males.** *Auris Nasus Larynx* 2006, **33**:31-35.
29. Oladipo G, Didia B, Okoh P, Hart J: **Sexual dimorphism in facial, nasal, maxillary, mandibular and oro-facial heights of adult Ijaws.** *Journal of Experimental and Clinical Anatomy* 2008, **7**:10-18.

Note: VRI Press, Vedic Research Inc. is not responsible for any data in the present article including, but not limited to, writeup, figures, tables. If you have any questions, directly contact authors.

Visit us @ [www.vedicjournals.com](http://www.vedicjournals.com) : DOI: <http://dx.doi.org/10.14259/tcb.v2i2.126>

Copyright © 2013-2014 VRI Press, USA. All rights reserved.

## Authors Column



**Dr E.A Osunwoke** is a lecturer in the Department of Human Anatomy, Faculty of Basic Medical Sciences, University of Port Harcourt, Rivers state, Nigeria. He has many research articles published in both local and international journals and has a PhD degree in human Anatomy.