ORIGINAL ARTICLE

Ethnic–based Photodocumentation of Nasofacial Angle: The Anioma Study

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ABSTRACT

Introductions: Human morphological variations, along with its attendant physiologic sequalae, have long been noted by physical anthropometrists to follow a combination of genetic and environmental factors. Anthropometric variation in angular craniometric norms, including the nasofacial angle, is not exempted from the influence of these factors.

Aim: This craniometric study was aimed at evaluating variation extant in obtained nasofacial angle among a sample population of adult Anioma subjects.

Methods and Materials: Participants' degree of nasofacial angle variation was measured in a cross section of one thousand (1000) Anioma indigenes by the use of photogrammetric techniques.

Results: Obtained results showed that sampled Anioma male subjects presented a mean nasofacial angle of 37.86°±3.22, with minimum and maximum values of 32.00° and 48.00° in the order given. Selected female participants showed a mean angle of 36.30°±3.89, which on statistical analysis, proved to be significantly different from obtained male values.

Conclusion: Research findings herein support the gender specific nature of nasofacial angle in the study population, thereby suggesting its forensic significance as a basis for subject identification, among others.

KEYWORD: Nasofacial angle, photodocumentation, Anioma.

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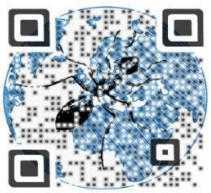

INTRODUCTION

In Nigeria and other sub-Saharan resource-mismanaged African countries, the scope of significance of physical anthropometry as a pure and applied scientific field, appears to have progressed, rather slowly, from its initial somewhat academic role as a discipline that provides standardized mean values for evaluation of various human traits, to an impact-based science, with ever evolving practical relevance in virtually all spheres of human endeavor. The French police expert, Alphonse Bertillon, it was who as far back as 1882, applied the anthropometric model in its judicial relevance, to criminal identification using measurable somatometric variables as his basis.[1]

In a related demonstration of anthropometric significance as it concerns the electioneering process, Igbigbi PS, the first Professor of Dermatoglyphics in sub-Saharan Africa, clearly defined the role of fingerprints and fingermarks in vote counts, in the much celebrated but now rested Ogboru vs Uduaghan 2011 re-election tussle.[2] Non linear angle-based craniofacial indicators of anthropometric variation, particularly nasofacial angle, have been utilized significantly in procedural applications relating to forensic medicine, ophthalmology and reconstructive facial surgery.

The nasofacial angle quantity defines the spatial relationship that exists when a vertical line drawn tangent to the forehead at the glabella and the chin at the pogonion (G – Pg line) intersects a second line drawn along the nasal dorsum. Like a vast majority of craniometric entities and quantities, the nasofacial angle is gender-specific, age-dependent and, shows distinct clear-cut variation with demographic influences including race, ethnicity, ecology and genetics. The primary aim of this study is to investigate the extent of craniometric gender variation that exists among the good people of the Anioma ethnic sub-nationality of Delta State in Nigeria.

MATERIAL AND METHOD

Materials here The research methodology adopted for this cross- sectional study included such steps of investigative enquiry as participant orientation, sample data collection and statistical analysis etc.

Research participant orientation

Subjects recruited into this observational study received a synoptic session of precise participant

orientation detailing among others, the aim, objectives, significance and overall nature of the present descriptive study. Onr thousand subjects between ages 18 – 65 years, comprising 500 male and 500 female subjects were selected for this study. All selected participants were pure unambiguous ethnic Anioma subjects, paternally and maternally, who had been resident within the limits of the geographical confines of Anioma land for a period of 5 years or more, acclimatizing to prevailing environmental conditions. Both grandparents were also of Anioma ethnic origin. Research participants volunteered information relating to their basic demographic profile including age, gender, place of birth and local government area of residence (with duration of stay).

Craniometric Data collection

For this craniometric analysis, the most important steps in its methodology were those taken to ensure the highest possible level of participant comfort and natural ease, given prevailing research conditions. In line with this paramount ethical consideration, nasofacial angle measurements were only obtained after subjects had been comfortably placed in the standard anatomical position. Left lateral cephalogrammetric images of each participant were obtained using a Cannon power-shot A470 digital camera, mounted on a tripod. Relevant craniofacial landmarks were then precisely selected on obtained cephalogram, including the glabella (G), pogonion (P) and nasal dorsum (Nd).

The magnitude of the angle formed by the intersection of a line drawn on subjects' left lateral cephalogram from the glabella superiorly to the pogonion inferiorly (G–P line) with a second line traced along the contours of the nasal dorsum (Nd line) defines the degree of angulation presented by each Anioma subjects' nasofacial angle.

Data Analysis

Continuous non-linear data collected from recruited Anioma subjects, in degrees and to one decimal place, were collated and presented to a team of Computer Scientists and Statisticians for data analysis using the Statistical Package for Social Sciences (SPSS) Gender differences in nasofacial angle were considered significant if calculated p-value was equal to, or less than 0.05.

RESULTS

Using the William S. Gosset *t*-test and related statistical tools in IBMs' SPSS, results obtained from analysis of collected data are presented in tables I and II, which summarizes descriptive and inferential statistics for male and female subjects respectively. Table III is presented for relative comparative purposes.

Table I: Mean value and standard deviation of nasofacial angle among sampled male Anioma subjects (n = 500).

Variable	R	Min	Max	Mean with SD
Nasofacial Angle	16	32°	48°	37.86°±3.22

Table 2: Tabular descriptive statistical presentation of minimum, maximum, mean values and standard deviation of nasofacial angle among sampled female Anioma subjects (n = 500).

Variable	R	Min	Max	Mean with SD
Nasofacial Angle	17	26°	43°	36.30°±3.89

Table 3: Comparative data on nasofacial angle measurement in other population gruops.

Author (Date)	Population/ethnic group	Nasofacial Angle (sample size)
Anicy-Milosivecy *et. al.*, (2008)	Croatian Subjects	Male subjects (58) : 29.53°±2.51 Female subjects (52): 30.36°±2.38
Reddy *et. al.*, (2011)	North Indians	Male subjects: 34.38°±1.77 Female subjects: 33.69°±1.37 (150 adults)
		33.26° (100 adult male subjects)
Jain *et. al.*, (2004)	Himachali Indian males	35.0°
Andrew and Schoenrock (1998)	North Americans	

DISCUSSION

Results of this angular craniometric study revealed that the mean value of nasofacial angle among Anioma subjects, 37.08º±3.56, showed variation along gender lines, from a male mean value of 37.86º±3.22 to a female value of 36.30º±3.89. This gender difference in observed nasofacial angle magnitude exceeded mere arithmetic differences to be statistically significant on William Gosset t test analysis at a selected level of significance of 0.05 or less. Statistically significant gender difference was a notable finding on research evaluation of a sample population of one hundred adult Ibo subjects wherein Anibor and Okumagba reported mean values of 40.1º±4.8 and 37.8º±4.8 in male and female volunteers respectively.3 However, the converse was observed to be the case among a study population of one hundred (100) adult Itsekiri subjects where mean nasofacial angles – 40.0º±4.3in males and 36.6º±5.2 in adult females – was noted to be non-gender dimorphic.3 Striking similarity in mean values of nasofacial angle of 37.8º±0.45 and 36.3º±0.37 in male and female subjects respectively were reported by Eliakim–Ikechukwu 4 on evaluation of a two hundred and seventy six (276) Ibo study population. In that particular craniometric bi-ethnic review of aesthetic angles, 4 reported a Yoruba mean nasofacial angle of 35.5º±0.38. This Eliakim–Ikechukwu 4 report displayed two rather interesting distinctions: firstly, the Yoruba mean of 35.5º±0.38 is the lowest value of nasofacial angle ever published for any Nigerian ethnic group. Secondly, the 37.8º±4.8 mean nasofacial angle reported by Anibor and Okumagba 3 for adult female Ibo subjects is the exact same mean documented by Eliakim–Ikechukwu 4 for studied female Ibo subjects in his 2010 review, differing only in their statistical measure of dispersion – standard deviation difference (Anibors 37.8º±4.8 against Eliakim–Ikechukwu 37.8º±0.45). Unlike the Anibor series and the present study however, obtained data in Eliakim– Ikechukwu study evaluation of adult Ibos and Yorubas did not reflect statistically significant gender differences. Although a consistent and regular pattern of statistical gender variation is yet to be established with respect to mean values of nasofacial angle, normative values show a tendency to be greater in males than females. This was the case in this current investigation and indeed, all reference published Nigerian studies on the variable of interest, up to the year, 2016. The 2012 single gender study conducted by Ukoha et. al., may be seen as an exemption being a male-only study.5 In the aforementioned Ukohas' discuss, studied adult

Igbo male subjects presented a mean nasofacial angle of 39.0º±5.79, with minimum and maximum values of 28.0º and 50.0º respectively.

Critical objective analysis of table III would reveal that mean values of nasofacial angle in Nigerian ethnic populations is greater vis-à-vis those reported for Croatian, North Indian, Himachali Indian and North American populations. Relative to obtained means in the current study, nasofacial angles documented by Anicy-Milosivecy 7 for adult male and female Croatian subjects (29.53º±2.51 and 30.36º±2.38 respectively) is comparatively low, as are those generated by Reddy for a sample population of 150 adult North Indians (male and female values of 34.38º±1.77 and 33.69º±1.37 respectively).5 While adult Himachali Indian males presented a comparatively low mean nasofacial angle of 33.26º, 6 a similar North American population evaluated by Farkas et. al., had a mean value 35.0º. 7 The widely held assertion that the Caucasian face is significantly smaller than the African face is supported by this research finding.

Greater projection and prominence of the pronasale, and a more posteriorly-sited glabella are morphological attributes known to result in greater nasofacial angle. Whether or not, these factors underlie the pattern of gender variation in values of nasofacial angle observed in this study, with its associated research finding of male dominance in studied parameter, is open to further anthropometric aetiological studies.

Conclusion

The principal conclusion to be drawn on the basis of the masses of non-linear craniometric means presented herein is that the anthropometric variable in focus, nasofacial angle in Anioma subjects, is both gender-specific and inconstant, vacillating as expected, along ethnic lines, geographical factors, age and even cultural influences.

REFERENCE

1. Olsen RD. “A Fingerprint Fable: The Will and William West Case”. Identification News. 1987; 37: 15-22.
2. Amaize R. Fingermarks in vote counts. Identification News. 2011; 12: 120-126.
3. Anibor E, Okumagba M. Photometric facial analysis of the Urhobo ethnic group in Nigeria. Archives of Applied Science Research. 2010; 3: 28-32.
4. Farkas LG, Hreczko TA, Kolar JC, and Munro IR. Vertical and horizontal proportions of the face in young adult North American Caucasians: revision of

neoclassical canons. Plast. Reconstr. Surg. 1985; 75:38.

5. Ukoha UU, Onochie OU, Chidi KO, Azuoma LA, Lasbrey A, Uchechukwu D, Lynda CN. Photometric facial analysis of the Igbo Nigerian adult male. Niger Med. 2012; 53: 240-411.
6. Anicy-Milosivecy S, Lapter-Varga M, and Slaj M. Analysis of the soft tissue facial profile by means of angular measurements. European Journal of Orthodontics. 2008; 2: 135-140.
7. Reddy M, Ahuja NK, Raghav P, Kundu V, and Mishra VA. Computer-assisted angular photogrammetric analysis of the soft tissue facial profile of North Indian adults. The Journal of Indian Or- thodontic Society. 2011; 3: 119-123.
8. Jain SK, Anand C, Ghosh SK. Photometric facial analysis: A baseline study. J. Anat. Soc. India. 2004; 53: 11-13.
9. Eliakim-Ikechukwu C, Ekpo A, Mfon E, Ihentuge C, Mesembe O. Facial Aesthetic Angles of the Ibo and Yoruba Ethnic Groups of Nigeria. Journal of Pharmacy and Biological Sciences: 2013; 5: 14-17.

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