

Sexual Dimorphism in Nasal Morphology as seen at the University of Ilorin Teaching Hospital, Ilorin, Nigeria.

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Abstract:

Background: The nose morphology is unique to individual and so, the nose form that will portray an individual sex and beauty is desirable in surgical reconstructions, beauty competition and in forensic medicine for sexual identification of unknown persons.

Aim: To determine sexual dimorphism among Nigerians using nasal morphology.

Methodology: Eight hundred and ninety three volunteers (428 males and 465 females) within the age range of 18 to 35 years were recruited for the study. Data were obtained from them using standard anthropometric methods and were analyzed using the Statistical Package for Social Science (SPSS Version 17.0) computer software. Values were expressed as mean standard deviation (SD) and a p-value of less than 0.05 was considered significant.

Results: Male to female ratio was 1:1.1, mean age for male was 26.48± 4.86 and female was 26.31±4.85. Mean BMI was 22.37± 1.73kgm² for males and 22.21±1.71 for females. All nasal parameters obtained were found higher in males than in females.

Conclusion: Sexual dimorphism exist in nasal morphology and so, Otolaryngologist and Plastic Surgeons should take this into consideration when planning for cosmetic rhinoplasty.

Key words: Sexual, Dimorphism, Nasal, Morphology, Rhinoplasty.

I. Introduction

Anthropometry is a term which refers to taking quantitative measurements of the human body. Numerous measurements of the body can be taken, ranging from bone density scans to height measurements. There are a number of ways in which anthropometric information can be utilized and there are several large databases of measurements from thousands of people which can be used for the purpose of comparison and study.¹ Application of anthropometric data is valuable in forensic medicine, racial identification and plastic surgery. The white race have a narrow, long and high nose (leptorrhine), the blacks have wide and flat nose (platyrrhine) and Orientals have a medium sized nose in between the first two (mesorrhine)². The nose may be evaluated by direct clinical measurements (morphometry), by photography (photogrammetry), lateral radiograph (cephalometry) or by a three dimensional (3D) scans and digitizers.³

Otolaryngologists once in a while may find themselves having to operate on the external nose of their patients. Nasal reconstruction may be needed following trauma, tumour excision or congenital malformation of the nose. In such instances, it is important for the Surgeon to bear in mind the existence of subtle differences in nasal morphology due to sexual dimorphism. In recent years, there has been a substantial increase in the number of cosmetic rhinoplasty on African women and as a result their nasal parameters should be taken into consideration during such surgical procedures².

II. Methodology

Eight hundred and ninety three volunteers (428 males and 465 females) within the age range of 18 to 35 years were recruited for the study. With the aid of a digital calipers, data were obtained from them using standard anthropometric methods and were analyzed using the Statistical Package for Social Science (SPSS Version 17.0) computer software. Values were expressed as mean standard deviation (SD) and a p-value of less than 0.05 was considered significant.

III. Results

Nine hundred and five volunteers were enrolled in the study, seven were excluded due to a BMI that was greater than 30kg/m² and three for previous nasal trauma and the other two for questionnaire filling errors. Eight hundred and ninety three (893) responses were analyzed. This comprises of 428 male (47.9%) and 465(52.1%) female. Giving a male to female ratio of 1:1.1 The mean age was 26.40±4.86 for the target population, 26.48±4.86 years for males, and 26.31±4.85 years for females. The age range was 18 – 35 years and there was no significant difference between the two sexes (p-value>0.05). The most modal age group in the study was the 26-30 years. Yoruba 736 (82.4%), Hausa 62 (6.9%), Fulani 41 (4.6%), Ibo 37(4.1%), others 17 (1.9%). Majority of the subject are of Yoruba ethnic group (82.3%) with the rest constituting a minority in the study.

Table.1: Showing facial measurement by sex.

| Measurement | Sex | PN | Max(mm) | Min(mm) | Mean(mm) | SD | P-Vale |
|---------------------------|--------|-----|---------|---------|----------|------|--------|
| Upper Facial Height (UFH) | Male | 428 | 75.34 | 44.26 | 66.21 | 5.11 | 0.000* |
| | Female | 465 | 74.82 | 44.12 | 64.96 | 3.94 | |
| Midi-Facial Height (MFH) | Male | 428 | 69.21 | 42.64 | 59.23 | 7.20 | 0.000* |
| | Female | 465 | 67.14 | 41.56 | 57.41 | 8.10 | |
| Lower Facial Height (LFH) | Male | 428 | 72.64 | 55.74 | 63.98 | 5.68 | 0.000* |
| | Female | 465 | 71.62 | 55.36 | 62.66 | 4.50 | |
| ANOVAs | | | | | | | 0.000* |

*Significant P-Value, Persons Number (PN) ** All measurements were taken in millimetres

The mean upper facial height was 66.21±5.11mm for males and 64.96±3.94mm for females, Mid-facial height was 59.24±7.20mm for males and 57.41±8.10mm for females and lower facial height was 63.98±5.68mm for males and 62.66±4.50 mm for females. A significant correlation (p<0.05) was observed in the two sexes in all the facial measurements as shown in Table.1.

Table.2: Showing the nasal measurement by sex.

| Nasal measurements | Sex | PN | Mean(mm) | SD | P-Value |
|-------------------------------|--------|-----|----------|------|---------|
| Nasal Tip protrusion(NTP) | Male | 428 | 17.72 | 4.81 | 0.0000* |
| | Female | 465 | 16.67 | 2.98 | |
| Length of the Nose(LN) | Male | 428 | 46.25 | 3.18 | 0.0000* |
| | Female | 465 | 45.10 | 3.50 | |
| Width of the Nose (WN) | Male | 428 | 41.21 | 3.53 | 0.0000* |
| | Female | 465 | 40.07 | 2.92 | |
| Width of the collumella (WC) | Male | 428 | 6.93 | 2.47 | 0.3174 |
| | Female | 465 | 6.86 | 1.98 | |
| Length of the columella (LCR) | Male | 428 | 12.64 | 1.96 | 0.0000* |
| | Female | 465 | 12.02 | 1.64 | |

*Significant P-Value. Persons Number (PN) ** All measurements were taken in millimetres

Nasal measurements: The mean nasal tip protrusion was 17.72±4.81mm in males, 16.67±2.98mm in females . The mean length of the nose was 46.25±3.18mm in males and 45.10±3.50mm in females. The mean width of the nose was 41.21±3.53mm in males and was 40.07±2.92mm in females . The mean width of the columella was 6.93±2.47mm in males and 6.86±1.64mm in females and the mean length of the columella was 12.64±1.96mm in males, 12.02±1.64mm in females. There was significant difference in all the measurements with P-value <0.05 except columella width in which P-Value >0.05.(Table 2)

Table.3: Nostril type by sex

| <IMLA (Degrees) | Nostril Type | Male 428 (48%) | Female 465(52.2%) | Total 893(100%) |
|-----------------|--------------|----------------|-------------------|-----------------|
| 55-69 | II | 5(0.6%) | 10(1.1%) | 15 (1.7%) |
| 40-54 | III | 50(5.6%) | 54(6.0%) | 104(11.6%) |
| 0 | IV | 15(1.7%) | 28(3.1%) | 43(4.8%) |
| 25-39 | V | 127(14.2%) | 155(17.4%) | 282(31.6%) |
| 1-24 | VI | 231(25.9%) | 218(24.4%) | 449(50.3%) |
| Total | | 428(48%) | 465(52.2%) | 893(100%) |

NB: Angle of Inclination of the Media Longitudinal Axis of the nostril with the horizontal (<IMLA).

15 (1.7%) subjects had nostril type 2 made of 5 males and 10 females. 104 (11.4%) had nostril type III made up of 50 males and 54 females. 43(4.9%) had type IV made up of 15 males and 28 females. 282 (31.7%) type V made up of 127 males and 155 females. 449 (50.3%) type VI made up of 231 males and 218 females. None in the study group with either type I or type VII nostrils. There was no significant sex difference in the distribution of the nostril type ($P>0.05$) table 3 above. From study therefore, nostril type VI is the commonest and also in both sexes.

IV. Discussion

The human nose differs in its anatomy and morphology between different races and ethnic groups. Several authors have described changes in its form attributable to race, climate and gender.¹⁻² The aim of this study was to determine the existence of sexual dimorphism in nasal morphology among Nigerians. A knowledge that will help improve nasal reconstructive surgeries, forensic medicine and facial beauty based on the individual sex.

The mean Body Mass Index (BMI) of participants were within normal hence effect of obesity on nasal morphology was taken into consideration.^{3,4}

The mean nasal length, width, height and weight were higher in males than in their female counterparts. This significant sex difference in most of the measurements carried out in this study was due to genetic make-up and inheritance which manifest as sexual dimorphism in this study.⁵ The sexual dimorphisms observed also said to have arisen due to the difference in the levels of testosterone between males and females, because testosterone was reported earlier to cause a direct increase in the size and mass of muscles and bones, and thus causing differences in anthropometric parameters between the sexes.⁶⁻⁹

This is in agreement with other studies by Olutu¹⁰ Oladipo¹¹ who reported higher value ($p<0.005$) of all parameters in males compared to females but in contrast to study by Garadawa et al who found no significant sex differences¹²

In this study, facial measurements were significantly higher in males than females which again demonstrated the existence of sexual dimorphism in this study.⁸ This is similar to the study by Garadawa et al⁹ and farkas et al.¹³ The mean upper facial height was longer than the mean lower facial height in both sexes and again similar to the findings of Garadawa et al⁹ and farkas et al.¹³

V. Conclusions:

All the measurements in this study showed significant differences between males and females (p -value <0.05). Thus reinforcing the existence of sexual dimorphism in the studied ethnic groups in Nigeria with higher values in males than females

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