

Nasal Anthropometry of Adult *Tiv* and *Idoma* Tribes of Nigeria

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Abstract

Nasalanthropometry measures nasal parameters for ethnic morphological nasal classification and categorization. This study was carried out to determine the nasal index in the target population and compare it in both sexes and with the result of other similar studies. The sample consisted of 600 youths aged 18 - 32 years. Data were collected through self-administered questionnaire to establish ethnic background. Nasal length and nasal breadth were measured using vernier calipers and the nasal index calculated according to standard formula. Statistical analysis was done using SPSS for windows version 20 (IBM Corporation, New York, USA). Statistical significance was considered at $p \leq 0.05$. The mean nasal length of *Tiv* was 4.4 ± 0.63 cm and the mean nasal breadth was 4.2 ± 0.59 cm. The mean nasal length of *Idoma* was 4.3 ± 0.67 cm and the mean nasal breadth was 3.9 ± 0.61 cm. There was a statistically significant mean difference in nasal breadth between the two ethnic groups ($p = 0.001$) with higher mean value in *Tiv* relative to *Idoma*. Both ethnic groups exhibited sexual dimorphism of nasal length, nasal breadth and nasal index with males having significantly higher mean values than females ($p < 0.05$). The mean nasal index of *Tiv* was 95.7 ± 10.97 while that of *Idoma* was 92.3 ± 11.03 . Based on nasal index, it was concluded that the nose type in the two ethnic groups was platyrrhine.

Keywords

Anthropometry, Nasal Index, Platyrrhine, *Tiv* and *Idoma* Ethnic Groups

1. Introduction

Nasal anthropometry is concerned with the measurements of the proportions, size and shape of the human nose. By applying anthropometric methods, it has become possible to quantify diversity of human phenotypes and specific features

that differentiate individuals and ethnic groups (Farkas et al., 2005; Franco et al., 2013). The nasal indices are among the most important cephalometric parameters useful in inter-racial and intra-racial morphological classification and categorization. They are useful in the description of the nasal morphological characteristics of human population in different geographical location. Based on the nasal index, there are three categories of nose namely: leptorrhine (nasal index ≤ 69.9); mesorrhine (nasal index 70 - 84.9) and platyrrhine (nasal index ≥ 85) (Williams et al., 1995).

Anthropologists have used nasal indices in many ethnic groups for categorization and gender discrimination (Anas, 2010; Jimoh et al., 2011; Omotoso et al., 2011; Oludiran et al. 2012; Eliakim-Ikechukwu et al., 2012; Eliakim-Ikechukwu et al., 2013; Ogah et al., 2014; Oria et al., 2018). Extensive literature search revealed paucity of published studies on facial anthropometry of *Tiv* and *Idoma* people of Benue State. The *Tiv* people are said to be of Bantu origin from the Central African continent, in the *Shaba* area of the present Democratic Republic of Congo (Shii, 2011), while the *Idoma* people reportedly migrated from *Apa* in Kwararafa Kingdom after her disintegration (Udo, 1970). These two ethnic groups constitute the major population blocks in Benue state of north-central Nigeria. The state derives its name from River Benue, the second largest river in the country and the most prominent geographical feature in the state. Its geographical coordinates are longitude 7°47' and 10°0' east, latitude 6°25' and 8°8' and it shares boundaries with five other states namely: Nasarawa to the north, Taraba to the east, Cross river to the south, Enugu to the south-west, and Kogi the west. The state also shares common boundaries with Cameroun on the south-east. Benue has a population of 4,780,389 (2006 census) and occupies a land mass of 32,518 square kilometres (Oria et al., 2018).

This study was, therefore, done to describe the nasal morphological characteristics and indices of the two ethnic groups. The observations and findings of this study would possibly provide platforms for similar extended studies in other ethnic groups for comparison and categorization.

2. Subjects and Methods

The study was carried out in Makurdi from May to November, 2015. A cross sectional sample of 600 subjects (300 *Tiv* and 300 *Idoma* with half of the subjects in each ethnic group being males and the remaining being females) was randomly selected for the study. Participants were informed of the procedure and purpose of the study and written informed consent was obtained from each participant. Demographical data including age, local government of origin, ethnicity, duration of stay in the land of origin, parental and grandparental origin was taken. Subjects within the age range of 18 - 32 years were selected for this study. The subjects were made to sit comfortably on a chair with the head held out straight in the anatomical position. Nasal length and nasal width were measured in centimetres using vernier calliper from which nasal index was later calculated.

Each measurement was taken twice and the average obtained.

2.1. Anthropometric Landmarks

The measurements were taken with standard anthropometric instrument (vernier callipers) using recognized skeletal landmarks according to Ross and Marfell-Jones (1991) as follow:

- 1) Nasion: The point on the root of the nose where the mid-sagittal plane cuts the naso-frontal suture.
- 2) Nasospinale: The lowest point on the inferior margin of the nasal aperture as projected in the mid-sagittal plane.

2.2. Measurement Technique

1) Nasal Length: Distance from nasion to nasospinale. With the subject sitting on a chair in relaxed mood and the head in anatomical position, a verniercalliper was used to take this measurement to the accuracy of 0.1 cm.

2) Nasal Breadth: Distance from ala to ala (interalar distance), measured at right angle to the nasal height. With the subject sitting on a chair in relaxed mood and the head in anatomical position, a verniercalliper was used to take this measurement to the accuracy of 0.1 cm.

Nasal Index (NI) was calculated according to Williams et al. (1995) as nasal breadth/nasal height \times 100.

2.3. Inclusion Criteria

The subjects considered for this study all belonged to either *Tiv* or *Idoma* ethnic group with two generations of indigenization. They were born and brought up in Nigeria to harmonize effects of environmental factors on the subjects. The subjects were healthy individuals free from any apparent nasal deformity.

2.4. Exclusion Criteria

Subjects who did not meet the inclusion criteria, specifically, those that did not belong to *Tiv* or *Idoma* ethnic groups, those below or above the stipulated age range, those with nasal trauma and those not willing to participate were excluded from the study.

2.5. Ethical Approval

In line with the Helsinki Declaration of 1975, as revised in 2000, ethical approval was obtained from Ahmadu Bello University Health Research Ethics Committee (HREC). The objectives of the study were explained to the subjects and only those who gave informed consent were included in this study.

2.6. Data Analysis

The statistical methods used to analyze the data included: 1) Descriptive statistics to describe measurement data such as means and standard deviations (SD).

2) Student t-test to compare mean values in males and females of the two ethnic groups. All data were analyzed using a statistical package SPSS for windows version 20 (IBM Corporation, New York, USA). Statistical significance was considered at $p \leq 0.05$.

3. Results

Six hundred (600) subjects were recruited for this study; three hundred (300) each from the two ethnic groups. From each ethnic group, half of the number (150) was males and the remaining half (150) was females. The age of this sample ranged from 18 - 32 years. The mean age of the study sample was 24.3 ± 3.5 years with a mean of 25.1 ± 3.6 years and 23.4 ± 3.1 years for male and female subgroups respectively. The age difference between the sexes was statistically significant ($p < 0.05$). The *Tiv* ethnic group had mean age of 25.5 ± 3.7 years for male and 24.0 ± 3.1 years for female subgroups respectively, while the *Idoma* ethnic group had mean age of 24.7 ± 3.5 years for male and 22.8 ± 3.0 years for female subgroups respectively.

The mean nasal length of male and female *Tiv* subjects was 4.6 ± 0.65 cm and 4.1 ± 0.51 cm respectively while the mean nasal breadth was 4.5 ± 0.58 and 3.9 ± 0.44 cm respectively. The mean nasal index in male and female *Tiv* subjects was 97.7 ± 11.85 and 93.6 ± 9.63 . Thus the *Tiv* sample exhibited sexual dimorphism with respect to nasal length, nasal breadth and nasal index with males having higher mean values than females and the differences were statistically significant as shown in **Table 1**.

The mean nasal length in male and female *Idoma* subjects was 4.5 ± 0.74 cm and 4.0 ± 0.49 cm respectively while the mean nasal breadth was 4.2 ± 0.59 cm

Table 1. Descriptive statistics for nasal length, nasal breadth and nasal index of *tiv* ethnic group.

Variable	Male	Female	t	p
Nasal length				
N	150	150	6.776	0.001*
Range (cm)	3.6 - 7.2	3.0 - 6.1		
Mean \pm SD	4.6 ± 0.65	4.1 ± 0.51		
Nasal breadth				
N	150	150	10.250	0.001*
Range (cm)	2.9-7.0	2.9-5.3		
Mean \pm SD	4.5 ± 0.58	3.9 ± 0.44		
Nasal index				
N	150	150	3.315	0.001*
Range	68.3 - 125.0	68.9 - 125.0		
Mean \pm SD	97.7 ± 11.85	93.6 ± 9.63		

$p \leq 0.05$.

and 3.6 ± 0.47 cm respectively. The mean nasal index in male and female *Idoma* subjects was 94.4 ± 11.19 and 90.3 ± 10.51 . Thus the *Idoma* sample exhibited sexual dimorphism with respect to nasal length, nasal breadth and nasal index with males having higher mean values than females and the differences were statistically significant as shown in **Table 2**.

The mean nasal length of *Tiv* was 4.4 ± 0.63 cm and that of *Idoma* was 4.3 ± 0.67 cm. The mean nasal breadth of *Tiv* was 4.2 ± 0.59 cm and that of *Idoma* was 3.9 ± 0.61 cm. The mean nasal index of *Tiv* was 95.7 ± 10.97 and that of *Idoma* was 92.3 ± 11.03 . Whereas no statistical difference existed in the mean nasal length of the two ethnic groups ($p = 0.072$), there was statistically significant mean difference in nasal breadth ($p = 0.001$) and nasal index ($p = 0.001$) with *Tiv* having higher mean values as shown in **Table 3**. **Table 4** shows the classification of nose type according to nasal index in the two ethnic groups.

Table 2. Descriptive statistics for nasal length, nasal breadth and nasal index of *idoma* ethnic group.

Variable	Male	Female	t	p
Nasal length				
N	150	150		
Range (cm)	3.6 - 7.2	3.2 - 6.0	6.564	0.001*
Mean \pm SD	4.5 ± 0.74	4.0 ± 0.49		
Nasal breadth				
N	150	150		
Range (cm)	3.4 - 6.0	2.9 - 5.0	9.745	0.001*
Mean \pm SD	4.2 ± 0.59	3.6 ± 0.47		
Nasal index				
N	150	150		
Range	66.0 - 126.8	50.0 - 113.6	3.303	0.001*
Mean \pm SD	94.4 ± 11.19	90.3 ± 10.51		

$p \leq 0.05$.

Table 3. Descriptive statistics of the study parameters according to ethnicity.

Parameter	<i>Tiv</i>	<i>Idoma</i>	t	p
Nasal length (cm)	4.4 ± 0.63	4.3 ± 0.67	1.803	0.072
Nasal breadth (cm)	4.2 ± 0.59	3.9 ± 0.61	4.734	0.001*
Nasal index	95.7 ± 10.97	92.3 ± 11.03	3.687	0.001*

$p \leq 0.05$.

Table 4. Classification of nose type according to nasal index of *Tiv* and *Idoma* ethnic groups.

Ethnicity	Nasal index	Classification
<i>Tiv</i>	95.7 ± 10.97	Platyrrhine (flat nose)
<i>Idoma</i>	92.3 ± 11.03	Platyrrhine (flat nose)

4. Discussion

The mean nasal index of *Tiv* males and females, from this study, was 97.7 and 93.6 respectively with a combined index of 95.7. Similarly, the mean nasal index (NI) of *Idoma* males and females was 94.4 and 90.3 respectively with a combined nasal index (CNI) of 92.3. It was, therefore, observed that the predominant nasal type among both ethnic groups, based on NI, was platyrrhine or broad nose. The result of the present study agreed with those from other studies about Nigerian ethnic groups having platyrrhine nose (Oladipo et al., 2010; Omotoso et al., 2011; Jimoh et al., 2011; Oludiran et al., 2012; Eliakim-Ikechukwu et al., 2012, 2013; Ogah et al., 2014; Oria et al., 2018). The studies cited above were conducted on one or the other of Omoku, Bini, Ibo, Ibibio, Yakurr, Yoruba, *Idoma* and Fulani ethnic groups of Nigeria. In contrast, in a study conducted by Anas (2010) on students of Bayero University Kano in Northern Nigeria, it was observed that Hausa females' nasal index value was less than 69.9 (leptorrhine) whereas that for the males was greater than 70 (mesorrhine). According to Abraham and Romo (2006) and Risley and Crooke (1915) respectively as in Jimoh et al. (2011), most Western Europeans have leptorrhine nasal morphology with long and narrow nose with a nasal index of 69.9 or less; the Bantus and Bushmen of South Africa as well as indigenous aboriginals in Australia have platyrrhine nose with broad nose with nasal index of 85.0 and above. Race, tribe and climatic conditions are variables that determine the shape of the nose. Narrower noses are said to be favoured in cold and dry climates while broader noses in warmer and moister ones as a consequence of natural selection in human evolution.

Sexual dimorphism, a condition where the two sexes of the same species exhibit different characteristics beyond the differences in their sexual organs, was apparent in our study. Nasal length, nasal breadth and nasal index showed sexual dimorphism in the two ethnic groups with males having significantly higher mean values than females and this is consistent with findings of other researchers (Anas 2010; Oladipo et al., 2010; Omotoso et al., 2011; Jimoh et al., 2011; Oludiran et al., 2012; Eliakim-Ikechukwu et al., 2012, 2013; Ogah et al., 2014; Oria et al., 2018). According to Farkas and Munro (1986) the nasal index is related to regional and climatic differences. It would be expected that ethnic groups in the same climatic region should not have much difference in their nasal indices. It then appears that the uniqueness of the nose exists in geographical clusters and may be determined by the environment interacting with genetic constitution.

The mean nasal height values obtained in our study (4.6 ± 0.65 cm and 4.1 ± 0.51 cm for male and female *Tiv* subjects; 4.5 ± 0.74 cm and 4.0 ± 0.49 cm for male and female *Idoma* subjects) were lower than the values obtained from previous research on *Idoma* (4.9 ± 0.18 in males and 4.8 ± 0.11 in females) (Oria et al., 2018); Bini (4.7 ± 0.11 cm in males and 4.6 ± 0.14 cm in females) (Omotoso et al., 2011); Yoruba (4.6 cm), Hausa (4.7 cm) and Fulani (4.7 cm) (Ogah et al., 2014). Our values were comparable to those of Ibo (4.3 cm) (Ogah et al., 2014);

Ibibio (4.1 cm in males and 3.8 cm in females) and Yakurr (4.0 cm in males and 3.6 cm in females) (Eliakim-Ikechukwu et al., 2013). In adult Chileans, the mean nasal length is 5.0 cm and 4.7 cm in males and females (Troncoso et al., 2008). In a study on an Indian population, Kaushal et al. (2013) summed that Brahmin males had nasal length of 47.59 mm, Muslims had nasal length of 45.88 mm and Majhabi-Sikhs had nasal length of 44.64 mm while in case of females, the sequence was Brahmins (44.09 mm) followed by Majhabi-Sikhs (41.41 mm) and Muslims (39.36 mm).

5. Conclusion

From the findings of this research and based on nasal index, *Tiv* and *Idoma* ethnic groups had platyrrhine nose. They also showed sexual dimorphism of their nasal length, nasal breadth and nasal index with males having significantly higher mean values than females. This study will provide additional baseline data which will be valuable in physical anthropology and in clinical practice for aesthetic or reconstructive surgery and also for forensic investigations.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- Abraham, M. T., & Romo, T. (2006). Rhinoplasty Multiracial, Otolaryngology and Facia. *Annals of Plastic Surgery, 1*, 11.
- Anas, I. Y. (2010). Nasal Index of the Hausa Ethnic Group, a Study Conducted on Students at Bayero University Kano. *Journal of Medicine in the Tropics, 12*, 42-44. <https://doi.org/10.4314/jmt.v12i1.69313>
- Eliakim-Ikechukwu, C. F., Iro, C. M., Ihentuge, C. J., & Bassey, T. E. (2013). Nasal Parameters of Ibibio and Yakurr Ethnic Groups of South South Nigeria. *Journal of Pharmacy and Biological Sciences, 5*, 23-26. <https://doi.org/10.9790/3008-0562326>
- Eliakim-Ikechukwu, C., Bassey, T., & Ihentuge, C. (2012). Study of the Nasal Indices and Bialar Angle of the Ibo and Yoruba Ethnic Groups of Nigeria. *Journal of Biology, Agriculture and Healthcare, 2*, 149-152.
- Farkas, L. G., & Munro, I. R. (1986). *Anthropometric Facial Proportions in Medicine*. Springfield, IL: Charles C. Thomas Publisher.
- Farkas, L. G., Katic, M. J., Forrest, C. R., Alt, K. W., Bagic, I., Baltadjiev, G. et al. (2005). International Anthropometric Study of Facial Morphology in Various Ethnic Groups/Races. *Journal of Craniofacial Surgery, 16*, 615-646. <https://doi.org/10.1097/01.scs.0000171847.58031.9e>
- Franco, F. C. M., Martins de Araujo, T., Vogel, C. J., & Quintão, C. C. A. (2013). Brachycephalic, Dolichocephalic and Mesocephalic: Is It Appropriate to Describe the Face Using Skull Patterns? *Dental Press Journal of Orthodontics, 18*, 159-163. <https://doi.org/10.1590/S2176-94512013000300025>
- Jimoh, R. O., Alabi, S. B., Kayode, A. S., Salihu, A. M., & Ogidi, O. D. (2011). Rhinometry: Spectrum of Nasal Profile among Nigerian Africans. *Brazilian Journal of Otorhinola-*

- ryngology*, 77, 589-593. <https://doi.org/10.1590/S1808-86942011000500009>
- Kaushal, S., Patnaik, V. V. G., & Kaur, P. (2013). Somatometric Analysis of Nasal Morphology in the Endogamous Groups of Punjab. *Human Biology Review*, 2, 1-11.
- Ogah, S. A., Ologe, F. E., Dunmade, A. D., & Lawal, I. A. (2014). Nasal Index as Seen at the University of Ilorin Teaching Hospital (UITH), Ilorin Nigeria. *Asian Journal of Multidisciplinary Studies*, 2, 9-13. <https://doi.org/10.9790/0853-13954548>
- Oladipo, G. S., Oyakhire, M. O., & Ugboma Henry, A. A. (2010). Anthropometric Studies of Nasal Indices of the Ekpeye and Ikwere Ethnic Groups in Nigeria. *Asian Journal of Medical Sciences*, 2, 167-169.
- Oludiran, O. O., Omotoso, D. R., & Sakpa, C. L. (2012). Nasofacial Indices among Children in Southern Nigeria. *African Journal of Biomedical Research*, 15, 141-143.
- Omotoso, D. R., Oludiran, O. O., & Sakpa, C. L. (2011). Nasofacial Anthropometry of Adult Bini Tribe in Nigeria. *African Journal of Biomedical Research*, 14, 219-221.
- Oria, R. S., Nandi, M. E., Obun, C. O., & Ogu, T. (2018). Nasofacial Forms among the Idoma Ethnic Group of Benue State, Nigeria. *Journal of Medical Science and Clinical Research*, 6, 63-68. <https://doi.org/10.18535/jmscr/v6i5.12>
- Risley, H. H., & Crooke, W. (1915). *The People of India* (682 p.). London: Calcutta & Simla, Thacker, Spink & Co.
- Ross, W. D., & Marfell-Jones, M. J. (1991). Kinanthropometry. In J. D. MacDougall, H. A. Wenger, & H. J. Green (Eds.), *Physiological Testing of the High-Performance Athlete* (pp. 223-308). Champaign, IL: Human Kinetics Books.
- Shii, B. I. (2011). *Christianity in Tivland: A History of NKST*. Makurdi: Oracle Business Limited.
- Troncoso, P. J. A., Suazo, G. I. C., Cantín, L. M., & Zavando, M. D. A. (2008). Sexual Dimorphism in the Nose Morphotype in Adult Chilean. *International Journal of Morphology*, 26, 537-542. <https://doi.org/10.4067/S0717-95022008000300005>
- Udo, R. K. (1970). *Geographical Regions of Nigeria* (pp. 138-147). Los Angeles, CA: University of California Press.
- Williams, P. L., Bannister, L. H., Berry, M. M., Collins, P., Dyson, M., Dussak, J. E., & Ferguson, M. W. J. (1995). *Gray's Anatomy: Skeletal System* (38th ed.). Philadelphia, PA: Churchill Livingstone.