

Original Article**A Morphometric Study of Nasal Index among Owo Indigenes of Ondo State, Nigeria**Godswill Ogheneyeborue Okoro¹, John N. Igabari², Great O. Owhefere¹**Abstract**

Objective: The purpose of this study was to investigate the morphometric characteristics of the nasal index among the Yoruba people of Owo, in Ondo State of Southern Nigeria, and to ascertain whether there is sexual dimorphism in their nasal characteristics. **Methods:** The study adopted the multi-stage, descriptive, cross-sectional survey design. A random sample of 130 males and 130 females between the ages of 18 – 55 years was taken. For each subject, the nasal height was measured and recorded as distance between nasion and subnasale while the nasal width was measured and recorded as distance between the most lateral points of right and left ala of the nose using a sliding digital caliper. Data obtained were analysed using both descriptive statistics (Mean and Standard deviation) and inferential statistics (t-test) to describe the nature of the data. **Results:** Data analyses showed that the mean nasal height was 42.34 ± 0.54 for males and 42.14 ± 0.56 for females and that the difference was statistically significant ($p < 0.05$). The mean nasal width was 40.77 ± 0.85 for males and 40.41 ± 0.42 for females and that the difference was statistically significant ($p < 0.05$). The mean nasal index was 96.68 ± 2.91 for males and 95.43 ± 1.66 for females, and that the difference between both groups was statistically significant ($p < 0.05$). Among the male respondents, 3.8%, 24.6% and 71.5% exhibited the Leptorrhine, Mesorrhine and Platyrrhine nose types, while for the female respondents, the respective proportions were 5.4%, 28.5% and 66.1% for Leptorrhine, Mesorrhine and Platyrrhine nose types. **Conclusion:** We observed sexual dimorphism in the nasal characteristics of Owo indigenes in Nigeria and the Platyrrhine type of nose was prevalent among them.

Keywords: Morphometry, nasal parameters, nose type, Owo indigenes, Nigeria

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Introduction

Morphometric studies use a variety of measurements and observations to show how the human body and skeleton are formed. One of the greatest phenomenon affecting people today is variation, which has links to several processes including natural selection and mutation. Numerous studies demonstrate the benefits of using anthropometric measurement as a tool for examining the variations in human population and as a crucial component of forensic science for criminal investigations. Since the 20th century, more advanced approaches to identifying physiological and anatomical variances have been

developed, alongside anthropometry as useful tools in the study of human species. Consequently, anthropometry has earned recognition in various aspects of medical sciences, including forensic medicine¹.

Nasal anthropometry is a field of study that measures a person's nose's proportion, size, and form². In forensics and physical anthropology, the study of nasal anthropology is crucial since it is one of the methods that could be used to identify an individual's race, ethnicity, and gender. It is the opinion of several researchers that race, sex, age, and environmental factors along with biological factors have impact on body dimensions,

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particularly in the head and neck regions³⁻⁵. In anthropology and forensic medicine, the knowledge of nasal index (NI) could be relevant in determining race, ethnicity and sex of individuals whose identity is not known¹. Nasal Index is also useful in the analysis and classification of fossil remains as well as in the study of living population. Since nasal analysis is the initial step in rhinoplastic surgery (plastic surgery of the nose), it is helpful in practical terms. A rhinoplastic surgeon must make adjustments to the nose's size or shape to get the desired aesthetic result. Additionally, the rhinoplastic surgeon can alter a patient's nose without jeopardizing the patient's wish to keep his beauty status by performing a nasal analysis of that patient's unique ethnic group⁵. Measuring the nasal index in healthy individuals helps dysmorphologists make an early diagnosis of various dysmorphic conditions including cleft lip and palate¹. The ratio of the nose's breadth to its height is used to calculate the nasal index. The height is measured when on skeleton from the nasion (where the inter-nasal suture touches the frontal bone) to a point slightly below the nasal spine. The maximum distance between the nasal sinuses is determined by the skull's breadth. The nasal height of a living person is measured from the nose to the sub-nasal (the area where the nasal septum touches the upper lip). The largest distance between the two nasal wings or two alae in anatomical position is the nasal width on a living human. Nasal index on a living human and nasal index on a skeleton typically do not correspond to one another⁶.

Leptorrhine is a term used to describe a nose that is long and thin, mesorrhine is used to describe a nose that is medium in size, and platyrrhine is used to describe a nose that is broad^{6,7}. A full and well-rounded nasal tip and a highly pronounced ala lobule are typical features of the platyrrhinenose. According to Jimoh et al., the leptorrhine nose has a very small prominent ala lobule and a well-defined nasal tip, whereas the mesorrhine nose has a small prominent lobule and a more pronounced nasal tip⁷. Sexual dimorphisms are evident in several studies. However, controversies also prevail. Hence, we proposed this study to investigate the morphometric characteristics of the nasal index among the Yoruba people of Owo, in Ondo State of Southern Nigeria, and to ascertain whether there is sexual dimorphism in their nasal characteristics.

Methods

This study consisted of 260 subjects comprising 130 males and 130 females. The multistage, simple random sampling technique was used. The study population was Owo indigenes of Ondo State State, Nigeria, who are between the ages of 18-55 years, and whose parents (maternal and paternal) did not have inter-caste marriage. Furthermore, subjects with deformed face or depressed nasal region were excluded from the study. For each subject, the nasal height was measured and recorded as distance between nasion and sub-nasale, while the nasal width was measured and recorded as distance between the most lateral points of right and left ala of the nose using a sliding digital caliper. All measurements were taken with the subjects in sitting and relaxed positions and their head in an anatomical position. The nasal index was calculated using the following equation:

$$\text{Nasal Index} = \frac{\text{Nasal Breadth}}{\text{Nasal Height} \times 100}$$

Data obtained were analysed using both descriptive statistics (Mean and Standard deviation) and inferential statistics (t-test) to describe the nature of the data. The statistical analysis was done with the aid of the Statistical Package for Social Science (SPSS version 24.0).



Figure 1: Diagram showing the measurement of the nasal width.

Results

The data collected from the 260 respondents were subjected to both descriptive and inferential statistical analyses and outputs were in four tables and one figure. Table 1 shows that the mean nasal height was 42.34 ± 0.54 for males and 42.14 ± 0.56

for females and that the difference was statistically significant ($p < 0.05$). Table 2 shows that the mean nasal width was 40.77 ± 0.85 for males and 40.41 ± 0.42 for females and that the difference was statistically significant ($p < 0.05$). Table 3 shows that the mean nasal index was 96.68 ± 2.91 for males and 95.43 ± 1.66 for females, and that the difference between both groups was statistically significant ($p < 0.05$). Table 4 presents the distribution of nose types within the framework of the study. Among the male respondents, 3.8%, 24.6% and

71.5% exhibited the leptorrhine, mesorrhine and platyrrhine nose types, respectively. For the female respondents, the respective proportions were 5.4%, 28.5% and 66.1% for leptorrhine, mesorrhine and platyrrhine nose types. On aggregate, the proportions were 4.6%, 26.6% and 68.8% for leptorrhine, mesorrhine and platyrrhine nose types, respectively. This clearly shows that Owo indigenes of Ondo State in Southern Nigeria, are dominantly platyrrhine in nose shape.

Table 1: Comparison of nasal height between males and females

Parameter	Group	Size	Minimum	Maximum	Mean \pm SD	p-value
Nasal height	Male	130	40.69	43.10	42.34 ± 0.54	0.004
	Female	130	40.69	43.10	42.14 ± 0.56	

Table 2: Comparison of nasal width between males and females

Parameter	Group	Size	Minimum	Maximum	Mean \pm SD	p-value
Nasal width	Male	130	40.10	42.42	40.77 ± 0.85	0.000
	Female	130	40.10	42.40	40.41 ± 0.42	

Table 3: Comparison of nasal index between males and females

Parameter	Group	Size	Minimum	Maximum	Mean \pm SD	p-value
Nasal index	Male	130	93.73	102.24	96.68 ± 2.91	0.000
	Female	130	93.73	102.16	95.43 ± 1.66	

Table 4: Distribution of Nasal shapes

Gender	Leptorrhine	Mesorrhine	Platyrrhine	Total
Male	5 (3.8%)	32 (24.6%)	93 (71.5%)	130
Female	7 (5.4%)	37 (28.5%)	86 (66.1%)	130
Total	12 (4.6%)	69 (26.6%)	179 (68.8%)	260

Discussion

Several Empirical studies have been carried out on the subject of nasal parameters among different races and tribes. A study on anthropometric study of the nasal index of adult native of Ikwerre tribe of Rivers State, Nigeria⁸, was carried out. In order to demonstrate its interest in forensic anthropology, the study obtained the nasal index of adult male and female Ikwerre locals in relation to age. For this study, 330 participants made up of 160 males and 170 females, between the ages of 20 and 59 were enumerated. The mean nasal index of females for ages 20-29, 30-39, 40-49, and 50-59 years were 87.45 ± 0.85 , 94.69 ± 1.30 , 93.90 ± 1.71 , and 93.94 ± 1.39 respectively. Similarly, the mean nasal index

of males for ages 20-29, 30-39, 40-49, and 50-59 years were 94.22 ± 0.8 , 90.46 ± 1.45 , 90.24 ± 1.10 , and 99.46 ± 1.68 respectively. Overall, males and females had mean nasal indices of 77.22 ± 2.11 and 94.23 ± 0.90 , respectively. The study found out that females had a greater nasal index in the age ranges of 30-39 and 40-49 years, while a higher nasal index was observed in males in the age ranges of 20-29 and 50-59 years. The outcome showed sexual dimorphism.

Another study⁶ done on nasal index and environment concluded that the nasal index was influenced by race, gender, climate and environmental factors influence the nose's size and shape. The study particularly concluded that nasal index was largely

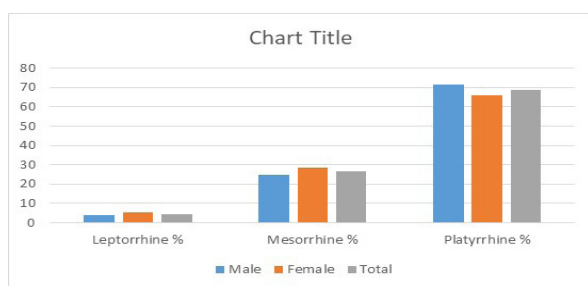


Figure 2: Percentage distribution of nasal types

influenced by weather, and that broad noses were prevalent in warm locations, while long, narrow noses were found in cold, dry climates. Another study⁹ on nasal parameters was done using 808 respondents selected from four Indian States of Uttar Pradesh, Bihar, Jammu/Kashmir and Kerala. The study observed the presence of nose types of leptorrhine, mesorrhine, and platyrrhine in the population, but that platyrrhine type was least common in the Indian population. Comparatively, males had higher nasal index than females in Uttar Pradesh, and that Leptorrhine nose was more prevalent in Kerala and Jammu & Kashmir. The study obtained the overall mean nasal index for males as 73.09 ± 0.46 and for females as 72.85 ± 0.36 respectively.

In another study¹⁰, researchers compared the nasal characteristics of populations from Northern Iran and northwest Nigeria with those from prior studies. The study examined 400 persons made up of 200 participants from Northwest Nigeria and 200 participants from Northern Iran. The study concluded that there were significant differences in the nasal breadth ($p=0.0001$), height ($p=0.0001$), and nasal index ($p=0.0001$) between the two groups. The study also affirmed that the nose shape distribution for the Iranians was 64% leptorrhine, 31% mesorrhine and 5% platyrrhine, while for the Nigerians, it was 37.5% leptorrhine, 60% mesorrhine and 2.5% platyrrhine.

A study on the anthropometric analysis of the nose index¹¹ and its clinical association was conducted to determine the population's nasal width and height in order to create a nasal index and categorize noses according to the determined index. 159 participants between the ages of 18 and 25 participated in the study. The study concluded that there was a highly significant difference between male and female nasal indices within the given age bracket, and that the most prevalent nasal type was mesorrhine. In Dehradun area of

Uttarakhand, India¹², researchers examined gender disparities and their statistical importance in the nasal characteristics within the adult Jaunsari tribe. The study was conducted using 100 adult males and 100 adult females from the Jaunsari tribe who were above 18 years of age. The study showed that the nasal index, associated variables, and total facial height differ significantly between males and females. In Nigeria, a study⁵ was carried out on Nasal morphological characteristics of 500 Bini Children within the 5-12 years age range. The study found out that male children had higher values for nasal parameters and that prevalence of the platyrrhine nose type was 70% for males and 68% for females.

This study showed that the males have a higher mean value compared to the females in the nasal index, nasal width and nasal index of Owo population. This finding is in agreement with previous studies,^{5,9,13} but at variance with whose work concluded that females have greater nasal index⁸.

The nasal values obtained in this study are at variance in magnitude with those previous studies^{6,8-10,14}. This could be due to the factors of racial physiology, climatic environment and precision of measuring instruments.

The most frequent nasal type in the current study was found to be platyrrhine in both males and females. This is in agreement with two studies whose study concluded that broad noses are associated with warm and moist climates^{5,6}. However this finding disagrees with the finding of concerning Northwestern Nigeria that had a prevalence of mesorrhine type of nose.¹⁰ However, this disagreement could be due to racial and climatic differences between Owo (South-West Nigeria) and North West Nigeria. The morphometric variations in nasal characteristics has gained the attention of specialist health professionals responsible for management of nasal challenges. The nose is often regarded as one of the useful indicators of race of an individual. The diverse shapes of noses are thought to be influenced by a variety of factors.

Conclusion

This study concludes that differences in mean nasal height, width and index between male and female Owo indigenes in Ondo State, Nigeria, were statistically significant, and that the Platyrrhine type of nose is prevalent in the study area.

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