



Anthropometric Comparison of Nasal Indices between Hausa and Yoruba Ethnic Groups in Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author IYA designed the study, collected the data, wrote the protocol, and wrote the first draft of the manuscript. Author MSS managed the statistical analyses and the literature searches of the study and all of us read and approved the final manuscript. All authors read and approved the final manuscript.

Original Research Article

Received 22nd March 2013
Accepted 31st July 2013
Published 6th December 2013

ABSTRACT

Aims: To measure the nose of the Hausa and Yoruba ethnic groups in Nigeria and to compare same with other ethnic groups. The working hypothesis is that the two ethnic groups will have the same nose type since they share same environmental conditions.

Study Design: This was a prospective study involving students from two schools in Kano, Nigeria.

Place and Duration of Study: Goron Dutse Secondary School in Gwale Local Government Area of Kano State and Bayero University Kano, Nigeria. The study started from September 2005 to November 2008.

Methodology: Five hundred and eighty two (582) subjects (both parents and 2 grandparents) purely Hausa or Yoruba, were randomly selected. They included 385 Hausa and 197 Yoruba ethnic groups. The nose height and breadth of each participant were measured in each subject using a sliding vernier caliper and the nasal index for each was calculated using the formula Nasal breadth/Nasal height X100. The data were analyzed using Minitab 16 software and Two-Sample T-Test was conducted to find out whether there is a statistically significant mean difference between sexes within a group and between same sexes between the two groups. The *P* value of .05 or less was

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considered statistically significant otherwise insignificant if more than.

Results: The mean nasal index for the Hausa ethnic group males was found to be 70.7 ± 11.3 which is greater than that of their females' counterpart that was 67.2 ± 8.3 . The Yoruba mean male nasal index was 100.9 ± 8.9 also greater than that of the Yoruba females which was 94.1 ± 8 . The mean nasal index of the Hausa males as compared to the nasal index of the Yoruba males, showed statistically significant difference ($P < .001$). The same statistically significant difference between the nasal indices of both Hausa and Yoruba females was also found ($P < .001$)

Conclusion: Both ethnic groups (Hausa and Yoruba) do not have the same nasal index and therefore not the same nose type with a sexual dimorphism existing in both ethnic groups. In this study, we were able to establish nasal index appropriate for this ethnic group and may be useful as a reference data to the plastic surgeons and other clinicians.

Keywords: Nasal indices; comparison; Hausa; Yoruba; Nigeria.

1. INTRODUCTION

Cosmetic surgeries concerning nasal region are not as common in our locality as in the rest of the world, but surgeons still do need to have some reference data concerning nose of the major ethnic groups in our country. Various studies have reported the varieties of nose and nasal indices of various ethnicities in Nigeria [1-8] and across the world [9-11]. The nose is not only accepted to be part of the facial features used in assessing beauty [12] but its index may suggest ethnicity, race or sex [9,13]. In addition, nasal index is a useful tool in the analysis and classification of fossil remains as well as the study of living populations [14]. The nose has since been classified into three: The typical Caucasian nose (long and narrow) classified as *Leptorhine* has nasal Index of less than 70; Medium nose of Orientals is classified as *Mesorhine* with nasal index of 70-84.90; while the Negroid nose that is short and broader is classified as *Platyrrhine* with nasal index of 85 and above [15]. Majority of black Africans were reported to be *Platyrrhine* [16] probably because of the nature of the African climate. In fact, strong correlation was reported between climate and nose shape, expressed as the nasal index [17]. Narrow nose (*Leptorhine*) is favored in cold/dry climates, whereas broader nose (*Platyrrhine*) is seen in individuals living in a warmer/moist climates [18]. There are several studies concerning nasal indices amongst ethnic groups in Nigeria with some comparisons between them. However, data are still lacking about whether individuals from different ethnic groups that share same environment will have the same nose type, since climate is believed to influence the variety of noses. Therefore, the aim of this study was to measure the nose of the Hausa and Yoruba ethnic groups in Nigeria living in the same environment, whether these groups will have the same nose type since climate and nose have a strong correlation. The significance of this study is mainly provision of nasal index (appropriate for these ethnic groups) which may be useful to the clinicians and to the plastic surgeons [19] as well as to the forensic anthropologists. The results from this study will also add to the pool of the anthropological data that may be used as a reference by other health practitioners' especially in Nigeria and across the globe.

2. MATERIALS AND METHODS

The study area was Kano State, one of the Northern states of Nigeria. The rainfall in this part of the country is less than 100cm, with long dry season that begins from October to April.

The wet season is shorter which is just for five months and the temperature is between 24-27°C and can be as high as 38°C [20].

The subjects of this study were from the two of the three major ethnic groups in Nigeria, the Hausa and the Yoruba. The Hausas are Negros and Sahelian people chiefly located in the northern Nigeria and southeastern Niger of West African region but can be found in the regions of Sudan, Cameroon, Ghana, Cote d'Ivoire, and Chad. Their language is a member of the Chadic language group, which is a sub-group of the Afro-Asiatic language family [21]. The Yorubas (also Negros), are large ethno-linguistic group in Africa that speak Yoruba and are believed to be of the same origin with Hausas [22] mainly found in the south-western region of Nigeria but can be found in other parts of the country. They are the 2nd largest population apart from Hausa in Nigeria [23].

Five hundred and eighty two (582) subjects were recruited from two schools in Kano State: Goron Dutse Secondary School and Bayero University Kano. This University is the biggest and cosmopolitan University in Kano State Nigeria with a huge number of students (> 35,000) from across the world. The majority of the students in the University are Hausa with a large number from Yoruba ethnicity. This study was conducted from September 2005 to November 2008 and was approved by the Ethics committees of the two schools. The subjects included 385 Hausa (224 males, 161 females) and 197 Yoruba (125 males, 72 females) aged between 17 - 25 years. Participants were selected randomly; non-mixed from at least two grand parentages. Informed consent was obtained from each subject and those with facial cleft or trauma, nasal disfiguration or nasal surgery were excluded from the study. *Repeatability*: Measurements of nasal width and height were taken each 3 times on a single subject at different interval on daily basis for 10 days. The data were analyzed using ANOVA and there was no significant difference between the means of the 3 set of values on nasal width or nasal height ($P>.05$).

The measurement error was calculated as $SD/Mean \times 100$ for the height and for the weight and the average of the two was 0.039 (3.9%). Measurements were taken while subject seated on a chair or bench, head positioned approximately in the Frankfurt plane. The height of the nose (NH) was measured using sliding vernier caliper, from nasion (outer point of intersection between the nasion-sella line and the soft tissue profile) to the subnasale (junction between the lower end of the nasal septum and the upper lip). The nasal width was measured from one ala to another. Nasal index was calculated using the formula: $Nasal\ index = (Nasal\ width / Nasal\ height \times 100)$. The data were analyzed using Minitab 16 statistical software. Two-Sample T-Test was conducted to determine variation of the nasal indices between sexes and between the two ethnic groups.



Plate 1: Nasal breadth



Plate 2: Nasal height

3. RESULTS

The data were analyzed using Minitab 16 statistical software. In the whole data, male subjects were more than the females in either of the ethnic groups (Table 1). Two-Sample T-Test was conducted to find out whether there is a statistically significant mean difference between sexes within a group and between same sexes between the two groups. The mean

nasal width of the Hausa males was found to be lower than that of the Yoruba males, but the mean nasal height of the Hausa males was higher than that of the Yoruba males (Table 2). Similarly, the mean nasal width of the Hausa females was lower than that of the Yoruba females, but the mean nasal height of the Hausa females was higher than that of the Yoruba females (Table 3). In addition, the mean nasal index of the Hausa males was also lower than calculated for the Yoruba males, and the mean nasal index of the Hausa females was still lower than that of the Yoruba females (Table 4). The mean variations (in all the measurements) between the two ethnic groups were found to be statistically significant ($P < .001$) within the same sexes (Tables 1-4). This was also the case for the nasal index. Furthermore, sexual dimorphism was recognized between sexes amongst the two ethnic groups with a statistical significance ($P < .001$). However, males were noticed to have higher values than the females. The frequency distribution of the nose types were shown in Tables 5 and 6.

Table 1. Percentage sex and ethnic group distribution of the subjects

Subjects	Males	Females	Total
Hausa	224 (38%)	161 (28%)	385 (66%)
Yoruba	125 (22%)	72 (12%)	197 (34%)
Total	349 (60%)	233 (40%)	582 (100%)

Table 2. Comparison of nasal width and height between Hausa and Yoruba males

Variables	Hausa n = 224 Mean ± 1SD (mm)	Yoruba n = 125 Mean ± 1SD (mm)	DF	F	t-value	P - value
NW (IAD)	39.5 ± 4.2	41.9 ± 2.5	344	35.1	-6.77	<0.001
NH (UFH)	56.7 ± 6.7	41.8 ± 3.7	346	526.1	26.71	<0.001

NW (Nasal Width), IAD (Inter-Alar Distance), NH (Nasal Height), UFH (Upper facial height)

Table 3. Comparison of nasal width and height between Hausa and Yoruba females

Variables	Hausa n = 161 Mean ± 1SD (mm)	Yoruba n = 72 Mean ± 1SD (mm)	DF	F	t-value	P - value
NW (IAD)	36.0 ± 3.1	39.9 ± 2.3	128	79.1	-8.66	< 0.001
NH (UFH)	54.0 ± 4.8	42.5 ± 2.3	229	380	24.79	< 0.001

NW (Nasal Width), IAD (Inter-Alar Distance), NH (Nasal Height), UFH (Upper facial height)

Table 4. Comparative nasal indices of Hausa and Yoruba ethnic groups

Sex	Hausa n = 385 Mean ± 1SD	Yoruba n = 197 Mean ± 1SD	DF	F	t-value	P - Value
Male	71.0 ± 11.3	100.4 ± 8.9	348	658.83	-19.23	< 0.05
Female	67.2 ± 8.3	94.1 ± 8.0	232	533.85	46.31	< 0.05

Table 5. Frequency distribution of the Nose types amongst the Hausa ethnic group

Sex	Leptorhine	Mesorhine	Platyrrhine	Total
Male	24 (6.2%)	131 (34%)	69 (17.9%)	224 (58.2%)
Female	85 (22.1%)	65 (16.9%)	11 (2.9%)	161 (41.8%)
Total	109 (28.3)	196 (50.9%)	80 (20.8%)	385 (100%)

Table 6. Frequency distribution of the Nose types amongst the Yoruba ethnic group

Sex	Leptorhine	Mesorhine	Platyrrhine	Total
Male	9 (4.7%)	18 (9.4%)	98 (51%)	125 (65.1%)
Female	6 (3.1%)	17 (8.9%)	44 (22.9%)	67 (34.9%)
Total	14 (7.8%)	35 (18.3%)	142 (73.9%)	192 (100%)

4. DISCUSSION

The working hypothesis is that the two ethnic groups will have the same nose type since they share same environmental conditions. The Hausa ethnic group in this study was found to be Mesorrhine similar to the Oriental nose [15,24]. However, Negros has been reported to be Platyrrhine [15] in contrast to what was obtained in this study and other studies amongst Negros. It means therefore, not all Negros are Platyrrhine probably because of the inter-ethnic genetic variability possibly playing more role than climatic differences. This is proven in this study where the two studied ethnic groups live in the same climatic conditions but having different nose type. Similarly, other studies amongst some minor ethnic groups in Nigeria reported individuals who are Mesorrhine [2,3,8] just like Hausa ethnic group (from northern Nigeria) despite the difference in climatic conditions. In this study, Yoruba are Platyrrhine confirming what was obtained on the same ethnic group in a different study [1,4] and similar to what was found in Igbo, Ijaws [1], and other minor ethnic groups [2,5-7] in Nigeria. However, the mean nasal index for the Yoruba in this study was higher than obtained on the same ethnic group living in another environment [4,25]. In addition, the mean nasal index for Hausa was quite lower than obtained in another study [25]. We believe that there are other factors that contribute to this variation which we still don't have any insight. Sexual dimorphism was found in this study with the males having higher nasal index than the females in all the two ethnic groups with a statistically significant difference. This has been the same in most of the studies conducted in Nigeria on rhinometry. It is therefore important for the plastic surgeons and clinicians to recognize this sexual and ethnic diversity in the nasal indices for better treatment of congenital or post-traumatic disfiguration in an individual.

5. CONCLUSION

The Yoruba ethnic group is Platyrrhine while the Hausa ethnic group is Mesorrhine with sexual dimorphism existing in both ethnic groups. Again, it can be inferred therefore that the Hausa and Yoruba do not have the same nose type even though they are all Negros and in the same environment. We therefore recommend further study amongst other tribes in northern Nigeria to compare their values with Hausas. We also recommend similar study to be conducted on the same Hausa and Yoruba ethnic groups living in the same environment but with a different climate from the one in this study, so as to compare the effects of climate as well as other factors.

CONSENT

This is not a case report but verbal informed consent was obtained before each subject was measured. The research and what it involved was explained to the subjects and have agreed that the findings be published including their images.

ETHICAL APPROVAL

This research was fully approved by the College of Health Sciences Usmanu Danfodiyo University Sokoto from September 2005 to November 2008. The Ethics committee of the Faculty of Medicine Bayero University and that of Goron Dutse also gave approval for the use of their students and staff for the conduct of the study only.

ACKNOWLEDGEMENTS

We (authors) would like to thank the staff and students of Goron Dutse Secondary School and Bayero University Kano for their cooperation and participation to see this study to success.

Special thanks to the HOD Anatomy, staff, our medical students and Auwalu from Anatomy Department, Bayero University for their assistance during the data collection.

COMPETING INTERESTS

Authors declare that no conflict or competing of interest exists.

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