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Nasal Index of Berom Adults in Kuru District of Jos South, Plateau State. Nigeria - a feature of sexual dimorphism.

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ABSTRACT
The study was conducted to evaluate mean nasal indices of Berom adult males and females in Kuru district of Jos South local government area of Plateau State, Nigeria. This was a cross-sectional study involving 314 adult Berom subjects, of which 199 were males and 115 were females. Direct method of anthropometry was used in data collection, which involved the use of Spreading Callipers and a meter rule in taking nasal measurements, which were morphological nose width and nose height. The data obtained was analyzed using descriptive statistics. The mean morphological nose width for males was 43.0 ± 3.5mm, SEM 0.2 and for females 39.0 ± 3.5mm, SEM 0.3. The mean nose height for males was 49.2 ± 3.6mm, SEM 0.3 and for females 45.7 ± 3.5mm, SEM 0.3. The mean nasal index for males was 87.7 ± 8.4, SEM 0.6 and for females 85.8 ± 9.2, SEM 0.9. The mean nasal indices of the Berom males and females showed that both sexes of the Berom adult population have the platyrrhine nose type. It can be concluded that males had higher statistically significant mean values than females. This confirms sexual dimorphism within the Berom adult population.

Keywords: Morphological nose width, Nose height, Nasal index, Sexual dimorphism, Anthropometry.

INTRODUCTION
The nose is the uppermost part of the respiratory tract and the organ for smell. It is the centre of the face and the most defining feature of a person's face. Several investigators have referred to the shape of the nose as a signature indicating ethnicity, race, age and sex.[1-9]

The size, shape and proportions of the nose give a visual basis suggesting the character of the person and it is an important key for a natural and aesthetically pleasing human face.[10] In addition, Troncoso et al[11] described the nose as one of the main components of facial aesthetics, it constitutes the 'aesthetic facial triad' (with the chin and lips as the other 2 components). Its general external anatomy includes the nasal bridge, slope of tip, septum and the nares which differ from race to race, tribe to tribe and from one environmental region of the world to another.[12]

Measurement of human individuals for the purpose of understanding human physical variation has been a long-time practice. Today, this practice is called anthropometry.[13] Anthropometry was first developed by the German Anatomist, Johanne Sigismund Elsholtz, as he worked on his doctoral thesis at the University of Padua in 1664.[14]

In ancient times, Anthropometry was used in criminology where criminals were identified by measuring parts of their body. During the earliest 20th century, one of its primary uses became the attempted differentiation between differences in the races of man.[15] Anthropometry stems from the measurement of the whole human body to individual body parts, such as the face, the nose, the limbs and the orbits.

Nasal anthropometry is the measurement of the different parameters of the nose. It is considered as one of the best clues to racial origin.[16] Anthropometric measurements of the nose provide objective data about the size and shape of the nose.[17] Anthropometric analysis of nasal anatomy is based on the comparison of measurements which are obtained separately from the anterior, lateral and inferior aspects of the nose. These measurements can be performed by direct or indirect methods.[18]

Direct methods are time consuming and have several other disadvantages, such as difficulty of patient adaptation, problems concerning repeatability of measurements and archiving of data. However, Nagle, Teibe and Kapoka [19] reported that anthropometrics based on direct measurements is simple, non-invasive and inexpensive. Also, Rogers, Hartnick and Hamdan[20] referred to direct anthropometry as the gold standard of anthropometry, though it requires experience and co-operation from subject.

Indirect measurement methods include: photogrammetry, cephalometry, stereography, laser

scanning and computerized tomography. These have become increasingly more popular in recent times. The most frequent methods used clinically are photogrammetry and cephalometry. It should be noted that anthropometry using special tools is not free from errors.[18] In essence, there are no significant differences among the direct and indirect methods of anthropometry.[11]

According to Oluwayinka et al[21] nasal anthropometry can be employed in identifying the race and sex of individuals whose identity is unknown, since normal nose morphology is dependent on gender, ethnic and environmental influences. Also, nasal index, an ethnic sensitive anthropometric tool known to exhibit sexual differences, is used by anthropologists to differentiate living race and subspecies of man.

Some researchers document that the shape of the nose can be classified based on the morphology and nasal indices. The nasal index is the ratio of nasal width (NW) to nasal height (NH) multiplied by 100. On the skeleton, the nasal height is measured from the nasion to a point just beneath the nasal spine. The nasal width is the maximum distance on the nasal opening of the skull. Normally, the nasal index on the skeleton and that on the living subject never correspond to one another.[21]

On the basis of the nasal index, Sharma et al[22] classified the nose into the following categories: Hyperleptorrhine (long narrow nose), designated by a nasal index of 40-54.9 (in living subjects), Leptorrhine (moderately narrow nose), is characterized by a least prominent ala lobule and a well-defined nasal tip when compared with the mesorrhine and platyrrhine nose types. It is designated by a nasal index of <70 (in living subjects) and <47 on the skull.

Mesorrhine (medium nose), is less prominent lobule and a more defined nasal tip in comparison to the platyrrhine nose. It has a nasal index of 70-84.9 (in living subjects) and 40-50.9 (on the skull). Platyrrhine (moderately wide nose), is characterized by a prominent ala lobule with full or rounded nasal tip. It is designated by a nasal index of 85-99.9 (in living subjects) and 51-57.9 (on the skull). The hyperplatyrrhine is a very wide nose, with a nasal index of 100 or more in living subjects and 58 or more (on the skull).

There are several anthropometric studies related with the nose. Naso-facial anthropometry is a specific component of the anthropometric field[23], which focuses on facial and nasal regions, vital for sex determination, Forensic Medicine, quantifying naso-facial dysmorphology, diagnostic comprehension and facial surgery. The use of accurate anthropometric craniofacial measurements is vital in the successful treatment and reconstruction of congenital and post-traumatic disfigurements.[23]

Farkas established a great body of work in craniofacial anthropometry by measuring and comparing greater than a 100 dimensions (linear, angular and surface contours).[18] Dr. Leslie Farkas known as the father of Medical Anthropometry[24] and his team of investigators conducted an International Anthropometric study of facial morphology in various ethnic groups and races.[25] They however reported that their study was the broadest yet conducted in terms of geographical reach and diversity of subjects. The study group consisted of 1470 healthy young subjects within the age range of 18-35 years, drawn from 5 regions of the world: Europe, the Middle East, Asia, Africa and North America. 25 ethnic groups were involved in the study and it took 5 years to complete. Some of the aims of the study were: to establish the normal range of measurements of craniofacial complex selected for study in all participating ethnic/racial groups; to identify the measurements that contribute most to significant differences between North American Whites (NAW) and other ethnic/racial groups.

In each participating nation, 30 males and 30 females (omitted in the Tonga nation), were examined by physical anthropologists, anatomists, plastic surgeons, dentists working in university hospitals and medical volunteers. These scientists volunteered their help to provide data for study. Farkas was in close contact with the participants, giving special attention for using the accepted anthropometric techniques to ensure the accuracy of measurements.

The largest study group of 780 subjects (53.1%), were of Caucasian origin and came from 13 countries in Europe (Azerbaijan, Bulgaria, Croatia, Czech Republic, Germany, Greece, Hungary, Italy, Poland, Portugal, Russia, Slovakia and Slovenia). 300 subjects (20.4%) came from 5 countries in Asia (India, Japan, Chinese of Singapore, Vietnam and Thailand). In Africa, the Tonga and Zulu nations, Angola and African Americans from the United States of African origin, were represented with 210 subjects (14.3%). 3 countries (Egypt, Iran and Turkey) were represented in the Middle East with 180 subjects (12.2%).

Fourteen anthropometric measurements were selected to determine the morphologic characteristics of the craniofacial complex. 5 of the anthropometric measurements were facial, 3 orbital, 1 labio-oral, 1 was of the head and 1 of the ears. 3 of the measurements were nasal, which were: nasal height, nasal width and nasal bridge inclination (for the sake of this study, only the results of mean nasal measurements will be discussed). The NAW distribution for a given measurement was divided into 3 categories: one central category, spanning + 2 standard deviation (SD) to - 2 SD around the mean as the normal range. The 2 outer categories designated either as significantly smaller (more than – 2 SD from the mean) or larger (more than +2 SD from the mean). Each subject's specific

measurement was placed in the appropriate category, resulting in a frequency distribution of counts. A goodness-of-fit x^2 statistic was calculated for the 3 observed frequencies compared with the expected frequencies derived from the NAW distribution. Only p values of ≤ 0.009 were considered statistically significant, those between 0.009 and 0.001 were termed very significant, and those < 0.001 were termed extremely significant. P values between 0.01 and 0.05 representing differences too small to be visually discerned were not considered significant.

The normal range in each resultant database was established, providing valuable information about major facial characteristics. The database of the NAW population was used as a reference group.

The mean values obtained for nasal measurements of the NAW young population are:

MALES: nasal height: 53.0mm; nasal width: 34.7mm; nasal bridge inclination: 31.6mm.

FEMALES: nasal height: 48.9mm; nasal width: 31.4mm; nasal bridge inclination: 30.0mm.

The results obtained from the analysis of nasal anthropometric measurements for Africans (in comparison with that of NAW), is discussed as follows: the nose height was identical to that of the NAW in all of African male ethnic groups and in female Angolans and Afro-Americans (no female measurements were available from Tongans; male Angolans with a nose height of 49.8mm and Afro-American males with a nose height of 51.9mm). In Zulu females, the nose height was extremely significantly greater (49.5mm). Nose width was extremely significantly greater in both sexes of 3 African ethnic groups and in male Tongans (Tonga males: 44.0mm**;** Zulu males and females: 42.0mm and 38.0mm respectively**;** Angolan males and females: 46.3mm and 40.8mm respectively**;** Afro-American males and females: 44.1mm and 40.1mm respectively). The inclination of the nasal bridge was identical to that of the NAW in both sexes in all African ethnic groups.

The nose height of the Caucasians was identical with that of the normal range in NAW in 92.3% of Caucasian males and 76.9% of females. The nose height was significantly greater in Greek females (52.8mm) and Portuguese females (57.8mm) and extremely significantly shorter in Hungarian females (52.5mm). The morphological width of the nose in both sexes of Caucasians was identical to that of the NAW normal range. The nasal bridge inclination in 92.3% Caucasian males and 84.6% Caucasian females was identical to NAW. Very significantly greater inclination was observed in male Azerbaijanis (39.8mm) and female Russians (38.9mm), and extremely significantly greater inclination in Slovenian females (39.9mm).

In the Middle Eastern groups, the nose width and nose bridge inclination were identical to NAW in both sexes. Nose height was extremely significantly greater in both sexes of Iranians (62.6mm in males and 58.5mm in females) and of Turkish females (55.2mm). In Asian ethnic groups, the nose height was identical to NAW in 4 of 5 ethnic groups, very significantly smaller in Indian males and extremely significantly smaller in Indian females. The nose width was extremely significantly wider in both sexes of Singaporean Chinese (39.2mm in males and 37.2mm in females), Vietnamese (40.2mm in males and 39.8mm in females) and Thais (40.8mm in females and 40.2mm in males) and in Japanese females (37.1mm), and very significantly greater in Japanese males (38.2mm). The nasal bridge inclination was identical to NAW in all female ethnic groups (100%) and in 4 out of 5 ethnic groups.

The study conducted above by investigators who worked separately across the world with small samples of the population is preliminary in nature and extent. It may fulfil its mission if medical and anthropological investigators continue the work of establishing normative data of the face.[25]

The nose of the Hausa and Yoruba ethnic groups was measured involving students from 2 schools in Kano, Northern Nigeria by Anas and Saleh.[26] It took a period of 3 years to complete. 385 pure Hausa subjects and 197 pure Yoruba subjects were selected randomly. The working hypothesis is that the 2 ethnic groups will have the same nose type since they share the same environmental conditions. The nose height and nose breadth of each participant were measured and the nasal index calculated. Data were analyzed using the Minitab 16 software and 2 sample t-test conducted to determine whether there is a statistically significant mean difference between sexes within a group and between sexes between the 2 groups. The p value of 0.05 or less was considered statistically significant, otherwise in-significant if more than. The mean nasal indices for the Hausa ethnic group males and females were 70.7 ± 11.3 and 67.2 ± 8.3 respectively, with a statistically significant difference between both sexes at $p < 0.001$. The mean nasal indices for the Yoruba males and females were 100.9 ± 8.9 and 94.1 ± 8 respectively, with a significant statistical difference between both sexes ($p < 0.001$). It was concluded that the Hausa and Yoruba ethnic groups do not have the same nose type, as the Hausa males have the mesorrhine nose type, the Hausa females with a leptorrhine nose type. Both Yoruba males and females have the platyrrhine nose type. Sexual dimorphism exists in both ethnic groups with the males having higher values of nasal indices.

Oladipo, Fawehinmi and Suleiman[27] conducted a study to determine and compare the nasal parameters of male and female Yorubas for any existing similarities or differences in Shaki polytechnic, Oyo State, (Western Nigeria). A sample size of 1000 (500 males and 500 females) Yoruba subjects, were randomly selected. The

ages of the subjects ranged from 18-45 years. Nasal width and nasal height were measured and nasal indices calculated. Results were analyzed using discrete statistics, while z-test was used for test of significance.

The males had mean nasal width, nasal height and nasal index of 3.83cm, 4.26cm and 90.02 respectively; while those of the females were 3.73cm, 4.47cm and 83.85 respectively.

The results showed that the Yorubas fall within the platyrrhine nose type and the nasal paremeters for the male Yorubas was significantly higher than that of the Yoruba females ($p < 0.05$). This confirms the existence of sexual dimorphism within the ethnic group.

Certain craniofacial parameters were measured by Oladipo et al[28]; including mean head circumference, nasal height (nasion to nasospinale of the nose), nasal width, and nasal index was calculated of adult Omoku ethnic group in Rivers State of the Niger-Delta region, Nigeria. 800 adults comprising 400 males and 400 females with ages from 18 years and above were used for the study. Statistical analysis was made with z-test at significance level 0.05. The mean nasal height for Omoku males was 4.66 ± 0.15cm, standard error of mean (SEM) 0.02; and females 4.36 ± 0.12cm, SEM 0.02. The mean nasal width for Omoku males was 4.01 ± 0.43cm, SEM 0.02 and mean nasal width for Omoku females was 3.73 ± 0.38cm, SEM 0.02. The mean nasal index for Omoku males was 86.09 ± 9.60, SEM 0.59 and for females 90.16 ± 9.20, SEM 0.59. This study showed that the mean values in males are significantly higher than those of females ($p < 0.05$), indicating sexual dimorphism. The results were in agreement with Franciscus and Long.[15]

MATERIALS AND METHODS

This study was a cross-sectional study, carried out using a total sample of 314 subjects which comprised 199 males and 115 females. The subjects were selected by simple random sampling within the Kuru district of the Jos Plateau, Plateau State, middle belt region of Nigeria.

The age population studied were between 18 and 54 years. The subjects were grouped according to age groups as shown in Table 1. From Table 1, it can be shown that majority of the subjects studied were within the age group of 20 – 24 years, while subjects of the least age studied were within the age group of 50 – 54 years.

Only healthy and fit individuals, males and females between the ages of 18 and 54 years were recruited for the study. Each subject was a resident of Kuru district, with both Berom parents and grand-parents. The subjects studied had no history of facial or rhinoplastic surgery, no facial deformity or nasal trauma, cleft lip or cleft palate or other congenital malformations / craniofacial deformities. Pregnant women were also excluded from the study.

Ethical clearance was obtained from the Ethical Committee of the Jos University Teaching Hospital, Plateau State.

Direct method of Anthropometry was used in taking measurements. Informed consent was obtained from each subject. Each subject was made to sit on a chair in a well illuminated room, in a relaxed mood without any facial gesture or expression. The head of the individual was directed anteriorly (the natural head position, NHP), in the standard Frankfort horizontal plane. [14] Four landmarks were identified, nasion, subnasale and alare (right and left); the landmarks were marked using a roller-tip pen before measurements were taken. The morphological nose width was taken from one ala nasi to the other; the nose height was measured from nasion to subnasale. The measurements were taken to the nearest 0.1mm using Spreading Callipers and a meter rule. Nasal index was calculated by multiplying the ratio of the morphological nasal width to the nose height by 100. Mathematically expressed as : Nasal index = [Morphological nose width/ Nose height] × 100.

Figure1: Picture showing measurement of Nose Height

The data obtained was analyzed using the Number Cruncher Statistical System (NCSS/PASS 2006 Dawson Edition, USA). Descriptive statistics was used in describing data obtained. P values were calculated using the student's "t" test for observed variables. P values < 0.05 were considered statistically significant.

RESULTS

Out of the 314 subjects studied, 199 (63.4%) were males, while the remaining 115 (36.6%) were females. The mean age of the studied population was 31.9 ± 10.8 years, ranging from 17-54 years.

Morphological Nose Width: The mean morphological nose width for males was 43.0 ± 3.5mm, SEM 0.2; that of females was 39.0 ± 3.5mm, SEM 0.3. Figure 1 shows an increase in the morphological nose width of males from the age groups 15 – 19 and 20 – 24 years. A decrease in value was seen within the age group of 25 – 29 years, followed by an increase within the age group 30 – 34 years. Within the age groups 35 – 39, 40 – 44 years and 45 – 49 years, there was a progressive decrease with the least value within the age group of 45 – 49 years. The morphological nose width began increasing after age 49 years with the highest value within the age group 50 – 54 years. Figure 4 shows a comparison between the morphological nose width of males and that of females. The graph shows that there was a steady increase in morphological nose width of females across the age groups of 15 – 19, 20 – 24 and 25 – 29 years. A decrease in morphological nose width was seen within the age group of 30 – 34 years (this occurred earlier for the males within the age group of 25 – 29 years). Following this, there was a continuous increase in morphological nose width in females across the age groups of 35 – 39 and 40 – 44 years; for the males, the morphological nose width remained relatively constant within the age groups 35 – 39 and 40 – 44 years. An intersection of the morphological nose width for both males and females was seen within the age group of 45 – 49 years. It was observed that the morphological nose width values for females were lower than that of the males in all age groups except for the intersection within the age group of 45 – 49 years.

Nose Height: The mean nose height for males was 49.2 ± 3.6mm, SEM 0.3; the mean nose height for females was 45.7 ± 3.5mm, SEM 0.3. Figure 3 shows a progressive increase in nose height for males, from the age groups 15 – 19, 20 – 24 and 25 – 29 years. After age 29 years, there was a decrease in nose height seen within the age group 30 – 34 years, to be followed by a progressive increase within the age groups 35 – 39 and 40 – 44 years. The highest nose height value was within the age group of 40 – 44 years. After age 44 years, within the age group of 45 – 49 years, there was a decrease in nose height value, followed by an increase within the age group of 50 – 54 years. Figure 5 shows a very similar pattern of nose height values for both males and females, but the nose height values for females were lower than that of the males in all age groups.

Nasal Index: The mean nasal index for males was 87.7 ± 8.4, SEM 0.6 and the mean nasal index for females was 85.8 ± 9.2, SEM 0.9. However, in females, figure 6 shows that the age groups 15 – 19, 20 – 24, 25 – 29, 30 – 34 and 50 - 54, had the mean nasal index of 84.7, 84.7, 84.8, 84.5 and 84.4 respectively; while the age groups 35 – 39, 40 – 44 and 45 – 49 had the mean nasal index of 86.1, 85.5 and 95.1 respectively. In males, figure 6 shows that the age groups 15 – 19, 20 – 24, 25 – 29, 30 – 34, 35 – 39, 45 – 49 and 50 – 54 had the mean nasal index of 86.1, 89.8, 86.8, 89.7, 87.1, 85.9 and 88.8 respectively, which all fall within the platyrrhine nose type; while the age group of 40 – 44, is the only age group that has a mean nasal index of 82.4, which falls within the mesorrhine nose type.

Table 1: Age Groups and Frequencies of Males and Females

Serial Number	Age Group	Frequency
1	15 – 19	37
2	20 – 24	68
3	25 – 29	40
4	30 – 34	44
5	35 – 39	41
6	40 – 44	28
7	45 – 49	32
8	50 – 54	24

Table 2: Morphological Nose Width for Males

Age Group	Frequency	Mean	Standard Deviation(SD)	Standard Error Of Mean(SEM)
15 – 19	22	40.7	3.5	0.8
20 – 24	37	43.4	2.6	0.4
25 – 29	26	42.9	4.8	0.9
30 – 34	30	43.9	2.6	0.5
35 – 39	27	43.0	4.1	0.8
40 – 44	20	42.9	2.9	0.6
45 – 49	22	42.2	3.1	0.7
50 – 54	15	44.6	3.2	0.8
	199	43.0	3.5	0.2

Table 3: Nose Height for Males

Age Group	Frequency	Mean	Standard Deviation(SD)	Standard Error Of Mean(SEM)
15 – 19	22	47.2	3.2	0.7
20 – 24	37	48.3	2.9	0.5
25 – 29	26	49.4	3.7	0.7
30 – 34	30	48.9	2.9	0.5
35 – 39	27	49.4	2.7	0.5
40 – 44	20	52.1	3.3	0.7
45 – 49	22	49.1	5.1	1.1
50 – 54	15	50.3	3.8	1.0
	199	49.2	3.6	0.3

Table 4: Morphological Nose Width for Females

Age Group	Frequency	Mean	Standard Deviation(SD)	Standard Error Of Mean(SEM)
15 – 19	15	37.3	3.5	0.9
20 – 24	31	38.2	4.1	0.7
25 – 29	14	39.3	2.8	0.8
30 – 34	14	38.6	1.4	0.4
35 – 39	14	39.6	1.5	0.4
40 – 44	8	40.6	4.0	1.4
45 – 49	10	42.2	3.4	1.1
50 – 54	9	39.0	4.2	1.4
	115	39.0	3.5	0.3

Table 5: Nose Height for Females

Age Group	Frequency	Mean	Standard Deviation(SD)	Standard Error Of Mean(SEM)
15 – 19	15	44.2	3.3	0.8
20 – 24	31	45.2	2.8	0.5
25 – 29	14	46.8	4.7	1.2
30 – 34	14	45.9	2.9	0.8
35 – 39	14	46.1	2.3	0.6
40 – 44	8	47.6	3.4	1.2
45 – 49	10	44.6	3.9	1.2
50 – 54	9	46.3	5.0	1.7
	115	45.7	3.5	0.3

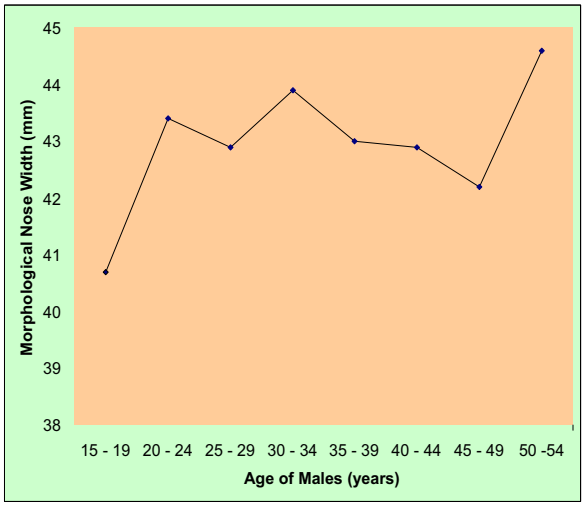

Figure 2: Graph of Morphological Nose Width of Males against Age Groups

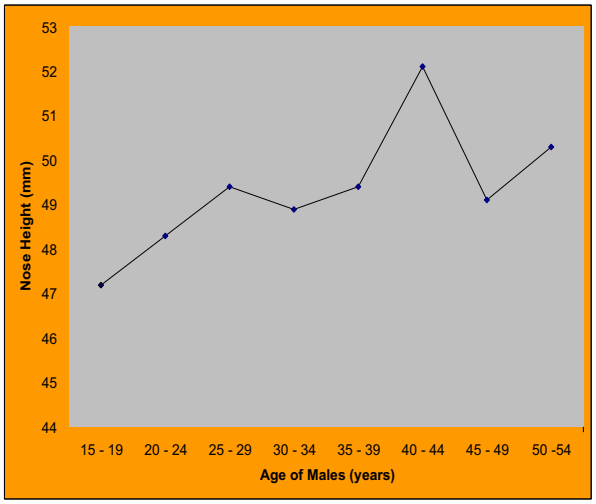

Figure 3: Graph of Nose Height of Males against Age Groups

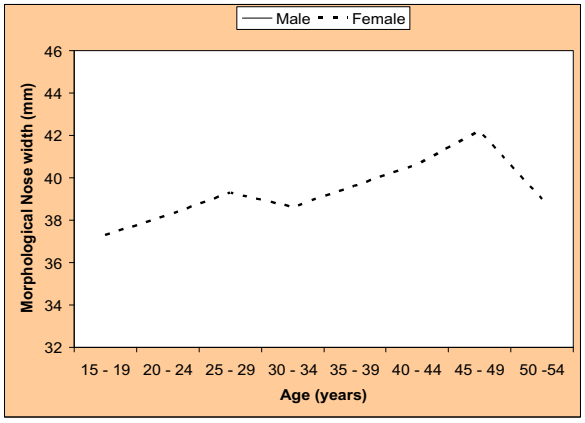

Figure 4: Graph comparing the Morphological Nose Width of Males and Females

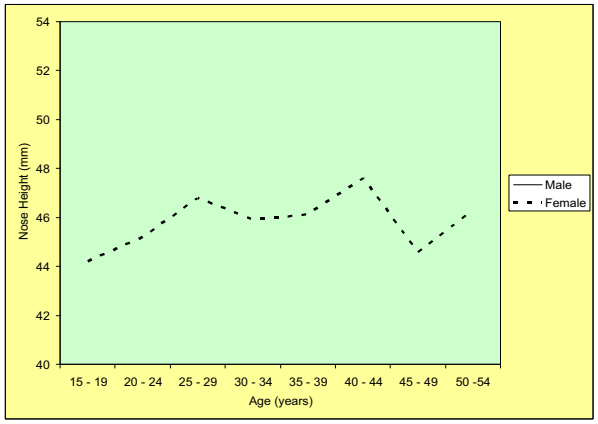

Figure 5: Graph comparing the Nose Height of Males and Females

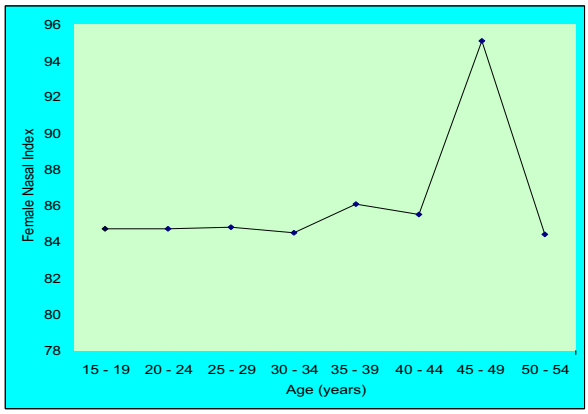

Figure 6: Graph showing the Mean Nasal Indices of Females against Age Groups

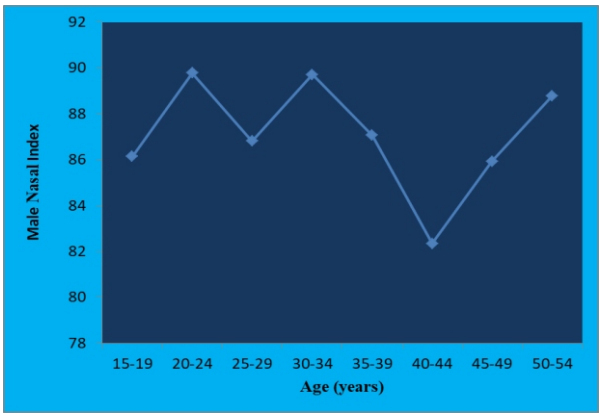

Figure 7: Graph showing the Nasal Indices of Males against Age Groups

DISCUSSION

It has been discovered that the factors influencing the variations in facial morphology refer mainly to environmental conditions such as trauma, ageing, surgery, socioeconomic status and nutritional habits of the populations.[25,29] However, theories that in hot, moist climates, the nasal aperture becomes much wider, present in all African ethnic groups in both sexes remain

unproven. Afro-Americans who have lived for centuries in the same climate as the NAW population have retained their greatly wider nose (unaffected even in cases of white and American-Indian ancestry). The great similarities between the NAW and the European Caucasians, together with the stable characteristics of Asians and Africans maintained throughout their ethnic groups, can be explained only by inherited genetic factors – an explanation widely accepted by scientists.[25]

The mean nasal indices of the Berom males and females showed that both sexes of the Berom adult population have the platyrrhine nose type. This finding is in agreement with the fact that Africans are platyrrhines.[30] However, the mean nasal indices for the female age groups 15 – 19, 20 – 24, 25 – 29, 30 – 34 and 50 – 54 years were 84.7, 84.7, 84.8, 84.5 and 84.4 respectively; the age groups 35 – 39, 40 – 44 and 45 – 49 had the mean nasal indices of 86.1, 85.5 and 95.1 respectively (figure 5). This depicts that the female population within the age groups of 15 – 19, 20 – 24, 25 – 29, 30 – 34 and 50 – 54 fall within the mesorrhine nose type and those within the age group of 35 – 39, 40 – 44 and 45 – 49 have the platyrrhine nose type. This shows that the Berom female population has some individuals with the mesorrhine nose type and others have the platyrrhine nose type. On the other hand, figure 6 shows that the males have the mean nasal indices for the age groups 15 – 19, 20 – 24, 25 – 29, 30 – 34, 35 – 39, 45 – 49 and 50 – 54 as 86.1, 89.8, 86.8, 89.7, 87.1, 85.9 and 88.8 respectively, which depict the platyrrhine nose type and only the age group of 40 – 44 have the mean nasal index of 82.4, which is the mesorrhine nose type.

All nasal parameters measured (except the nasal indices calculated for each age group), showed that males had higher statistically significant mean values than the females. This confirms sexual dimorphism within the Berom adult population, which agrees with the findings of Franciscus and Long.[15]

The nasal parameters measured were seen to vary in value for the various age groups for both males and females. In males, the mean morphological nose width increased steadily from the age groups of 15 – 19, 20 – 24 and 30 – 34 years. This finding could be explained by the statement: 'It is thought by experienced clinicians that the nasal cartilages continue growing into adulthood', as documented by Meyer.[31] However, there was a steady decrease in the mean morphological nose width of males within the age group of 35 -39, 40 – 44 and 45 – 49 years. The decline in mean morphological nose width was at the least value within the age group of 45 – 49 years. The mean morphological nose width was seen to increase after age 49 years, with the highest value within the age group of 50 – 54 years.

The mean morphological nose width of males in comparison with that of females shows that there was an intersection of values for males and females within the age group of 45 – 49 years (figure 3). That is, the males and females had the mean morphological nose width of 42.2 ± 3.1mm, SEM 0.7 and the females 42.2 ± 3.4mm, SEM 1.1 respectively within the age group of 45 – 49 years (there was no statistically significant difference at $p < 0.05$).

The highest mean nose height values for both males and females were observed within the age group of 40 – 44 years (figure 4).

CONCLUSION

This study revealed that both male and female Berom adults fall within the platyrrhine nose type based on their mean nasal indices; but the mean nasal indices calculated for the various age groups of males and especially females, showed that some age groups had the mesorrhine nose and other age groups had the platyrrhine nose. However, for all males, there was a higher statistically significant mean nasal index than the mean nasal index for all females; also, the mean morphological nose width and mean nose height were seen to be significantly higher for males than for females at $p < 0.05$. Thus, from the results obtained, nasal index in the Berom adult population is an attribute of sexual dimorphism, and can be used as an important parameter for the determination of sex especially in the study population and study area.

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